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EDITORIAL NOTES.

Parliament and the Gas Industry's Coal Supply.

SUCCESS in one direction attended, and it is hoped that success in another direction will attend, the meeting which was held last Wednesday, in one of the Committee rooms at the House of Commons, between members of Parliament and the deputation appointed for the purpose at the recent conference of representatives of the gas and electricity industries. The success gained on this occasion was that something like 200 members of Parliament were present to meet the deputation. This is a number that no doubt exceeded the most sanguine expectations of the latter; but not a number in excess of the importance of the question or the occasion. However, the fact that this number responded and listened to the representations and the informative speeches of members of the deputation, should have a distinctly influential effect in promoting the objects sought by the deputation, which objects (as were shown by word and statistics) are not moulded by selfishness, but by public convenience and public interests. This is emphasized by the fact that the deputation comprised not only members of companies engaged in public services in which coal is of fundamental importance, but members of local authorities carrying on similar supply systems. Upon these industries Parliament has placed certain responsibilities; and therefore to Parliament in times of extraordinary circumstances, and now circumstances without parallel, these industries naturally turn for such assistance as alone can be rendered by it. The objects the deputation had in view were educative; and there can be little doubt that the information laid before the members of Parliament at this unique conference will be of material help, combined with the report of the Home Office Coal Supplies Organizing Committee and that of the Board of Trade Coal Committee, in promoting efforts for producing an easier condition of things in relation to coal. It was a coincidence that the report of the former Committee should have seen the light of day on the morning of the conference with members of Parliament; and it should lend strong support to furthering the ameliorative movement. The conference was a private one; perhaps it were best so. But we are, in consequence, unable to give a report of the proceedings beyond this reference and the notice elsewhere. This much, however, we are able to say, that the members of the deputation were well received; that the excellent representative gathering of members of Parliament was highly interested; and that they are meeting again to-day (Tuesday) to further discuss the question. The important thing is that, as in the case of munitions, this is a matter that requires prompt consideration and action. Attesting this is the opportune report of the Home Office Committee.

The effect of the conference was felt and heard in the House on Thursday night, when the question of the high prices of commodities was under discussion. There were several references to it; and it was plain that, on the members who had been present, a distinct impression was made as to the seriousness that the coal position holds for industry and the country generally. The President of the Board of Trade acknowledges the situation is one that has caused him and all concerned the deepest anxiety; but there is some doubt —we say this with all respect—as to whether, in the great pressure of multifarious calls and claims, the President does appreciate fully the gravity of the position looked at prospectively. Several members in Thursday's debate called the attention of the right honourable gentleman to this—Mr. Rowlands and Sir William Pearce among others. The former assured the President that had he been at the conference on Wednesday, he would have known that he was face to face with a problem which, in the interests of the community, must be grappled with, and at once. Mr. Rowlands was a member of the Board of Trade Coal Committee; and he is more than ever satisfied that their report (which was issued last Easter) was fully justified. The apologists for the coal owners and factors may come forward, and make all manner of plausible excuses; those concerned with one coalfield may thank goodness that they are not as other coalowners are. But the fact remains that those who would deal fairly, and not make war conditions a special means of personal enrichment, are in the minority, and unfortunately the others are in the majority. It is easy to quote, too, certain extensive buyers who have, on the average of their purchases, come off, in the matter of increased price, fairly lightly compared with other undertakings (of which we know) of smaller buying capacity, and therefore less influential. The facts of experience exist, and cannot be hidden by mere words. It is not only a question of price, but of supply; and from what Sir William Pearce knows, through his relations with the gas industry as a chemical manufacturer, of the position of gas undertakings in respect of coal, he was able seriously to warn the Government in regard to a point which is important among other considerations. "I am afraid," he said, "that the new Minister of "Munitions may find that he is up-against one other pro-"blem which is of a most serious nature." Those words have more than a superficial meaning. However, criticism was freely uttered on the matters of prices, supply, and freights. They are all present as solid facts, and threatening (if effective action is not taken) more acute difficulties. And the critics did not hesitate to say that, in their opinion, the Board of Trade had not done all that might have been done, and earlier than now.

But Mr. Runciman will not have it that the Board have not been sufficiently alert. He announced that he had almost come to an agreement with the Midland coalowners regarding a limitation of price; and he thought this would be of interest to gas and other companies. There are rumours that the agreement will be on the lines of an allowance upon pre-war pithead prices to fairly cover enhanced costs due to the war. The Midland coalfield is not the only one in which gas and other industries are concerned; and any agreement should comprehend the whole of the fields. Probably Mr. Runciman has this in view. It is hoped so, but agreements should be promptly made. A voluntary soldier is better than a conscript; and heartily welcomed and applauded would be a voluntary move on the part of the coalowners in other fields in asking for an immediate inquiry into their position as to price and the fixing of a fair sum to compensate increased costs. It may be suggested that the Durham coalowners should lead the way in this matter, as being professedly the least of sinners in respect of high prices. With their lead, others would surely follow. But whether there is voluntary movement or not, there is one monitory passage in Mr. Runciman's speech which will not be overlooked by coalowners generally. He remarked: "It must be perfectly "obvious that, if we are not fairly met by agreement, Par-"liament will not tolerate any exploitation." Mr. Runciman, we also see, has not been misled as to what the increase in the miners' wages actually means in increased costs per ton. He says 1s. 6d. is "extravagant;" and with this the "Iron "and Coal Trades Review" agrees, for the other week our contemporary estimated the cost of the war bonus at 7d. or 8d. per ton at the pithead [see *ante*, p. 496]. Although coalowners have sought interviews with him, the President is satisfied that the present pithead prices of coal are far in excess of what are justified.

These are matters with which there can be agreement; there are others with which there must be disagreement. We do not think the President is quite at home in his information as to the accumulation of stocks on gas-works; and it is not by any means a question of London only. There are numerous other gas-works, and important ones, too, that are in a very ugly position, for the time of the year, in regard to stocks, and the managers of which could tell the President a very faithful lugubrious tale as to their situation

and anxieties. There will also be disagreement with the defensive position he took up as to freights for interned vessels—especially disagreement on the part of those companies who willingly suffered from the commandeering by the Government of vessels which were conveying their own coal at a reasonable price per ton, and who afterwards had to pay the Government exorbitant rates for steamers not constructed for coal carrying as were those commandeered. It is rather surprising, too, to find Sir Clifford Cory quoting in the House a statement by Lord Joicey, on the occasion of a deputation of coalowners waiting upon the President of the Board of Trade, that the gas companies were deserving of no commiseration whatever. For what reason? That, according to fiction, certain gas companies entered into contracts with Germany before the war started for 300,000 to 400,000 tons of coal. It has been authoritatively declared that no London Company did anything more than buy experimental quantities; and the Board of Trade returns for last year showed that the total import of coal, coke, and manufactured fuel only amounted to about 43,500 tons. Because a certain company or companies bought an experimental lot or lots of German coal, it is rather a hard-hearted Lord Joicey who would deprive gas companies generally of any commiseration they can manage to get from others than the coalowners. We believe, too, that there are those bearing the name of "Cory" who have no cause to complain of their business relations with the gas industry. The dragging into the discussion of this piece of German fiction, by one interested in coal and coal shipping, obviously for the express purpose of diverting sympathy from gas undertakings, did not assist in producing a solution of the problem of coal supply in relation to national interests, which is a greater present problem than the one of coal supply in relation to the interests of individual coal owners, factors, and shippers.

However, there is satisfaction that there is now serious movement, and that those who alone can influence the position have greater cognizance to-day than they had before of how much a good and reasonably priced supply of coal will favourably affect the fortunes of the country internally, and in connection with the war.

Problem of Sufficient Coal Supplies—Solution in the Hands of the Miners.

MARSHALLING all the conditions bearing upon it, it is found that the position of coal output in the United Kingdom is not so bad as anyone might have imagined who gave credence to all the coalowners put forward as justification (in addition to increased costs) for the considerably higher market and contract prices for coal. Such shortage as there has been, and still is, in output—because there is a shortage—is, it is satisfactory to learn, amenable to correction if those who are capable of bringing about the correction will only bestir themselves with patriotic intention. These, in brief and in general, are the conclusions to be drawn from the report of the Coal-Mining Organizing Committee appointed, on Feb. 23 last, by the Home Office to consider the position of coal supplies, and the best means of filling any gap that there may be in the quantity required to meet demand. The questions involved are important and urgent ones. The relation of supply to demand is at the very root of much of the trouble that has been experienced, accentuated by shipping and freightage, and railway dislocation owing partly to military necessities, and partly to the want of better organization of rolling stock and transit. Despite the urgency of the inquiry, the Committee were rather more than three months before they were able to sign their report. But the fault was not theirs. Primarily this was a statistical investigation; and with Sir Richard Redmayne, K.C.B., Chief Inspector of Mines, as Chairman, the Committee were in the position to know precisely how to go to work to achieve the object of obtaining accurate data. Statistical collection and compilation of this kind absorb time; and, in this case, figures were indispensable to the ascertaining of the extent of the falling-off of output, and of the causes of the falling-off, before the Committee could advise as to the means to be taken to ensure that future supplies were at least coequal with the demand.

The position can be put in a nutshell. During the seven war months, from August last to the end of February, the average monthly falling-off of output was 3,044,329 tons, or a total loss of about 13½ per cent. Roughly speaking, this is equivalent to an annual loss of something like 36 million tons. This drop in output is due entirely to the number of men who have joined the forces, and not to any extra abstention from work. This is clearly proved by the fact that to the end of February, 191,170 mining hands had joined the forces; but the net decrease at the same date in mining labour (this figure is derived from returns representing some 89 per cent. of the labour employed in the coal industry) is 134,186, or 13½ per cent. of the men at work in July, before the outbreak of the war. The difference between the two numbers is due to the inflow of labour from other industries, some of the men so coming in having had previous experience of mining work. The net percentage reduction of men precisely corresponds with the 13½ per cent. reduction in the output of coal. Therefore, the men remaining have not, speaking collectively, worked any worse or any better than preceding the war. Of the 36 million tons reduced output, the Committee calculate the probable saving through the lessening of the quantity of coal exported as 24 million tons, leaving a shortage of some 12 million tons. The Committee, in our view, have rather under-estimated the savings to be effected in the exports. The coal liberated, owing to the closing of certain foreign markets—Germany, Russia, Belgium, Austria-Hungary, and Turkey—is alone about 18½ million tons. In the "JOURNAL" for May 11 (p. 320), it was shown that the actual reduction in the quantity of coal exported since the war started to the end of April was 21,604,723 tons; and the returns just to hand for May exhibit a further reduction of 2,501,806 tons—making a total of 24,106,529 tons in the ten months, or already somewhat in excess of the Committee's estimate. Yet during only a fortnight of the time have the Coal Exports Regulation Committee been at their work. The actual decrease in the twelve months, *plus* the work of the Exports Committee, ought to do something to reduce largely the 12 million tons. Of course, one cannot say what the home demand of the immediate future will be, including that required by the Navy; but the home demand has been, and is now, just about normal. The Committee, however, in considering this point, do not appear to have made sufficient allowance for the requirements that, given adequate distribution power, have to be met to make good the tremendous inroads into stocks, which will have to be more than compensated if next winter is to be passed through by the gas and other industries without their supplies and their work generally being jeopardized.

However, if we take at 12 million tons the amount to be made good to meet necessities under current conditions, the Committee show conclusively that there is a single available process by the exercise of which compensation could be realized. During the seven months preceding the war, the loss of time by the miners was 10·7 per cent.; and for the seven months succeeding the outbreak of the war, it was 9·8 per cent. The conclusion at which the Committee arrived is that fully 4·8 per cent. of this is avoidable absence. We would rather call it an "avoidable waste of power," which could be exercised in the National interests. The Committee look upon the suppression of this 4·8 per cent. of avoidable absence as the best possible means of increasing output; and if the men would only fall in with this, and put in full time, the output could be increased by between 13 and 14 million tons, as compared with the estimated 12 millions deficiency under current conditions. The Committee, however, do not think perfection is to be expected in this connection. Every miner may not be able to equal the patriotism of the 191,170 comrades who were prepared, if need be, to lay down their lives for their country. But every miner can do his patriotic utmost by putting in full time. The Committee are sanguine that, if the matter is only put before the men in a proper manner, the response will be good; and very rightly and diplomatically, they think that the body best qualified to state the case to the miners and secure a good response is the Executive of the Miners' Federation of Great Britain.

From the foregoing, it is seen that the shortage in supplies is capable of being easily made-up by blotting-out avoidable idle days. But the Committee, not being oversanguine as to an absolute "perfection" in this direction, have looked around to see what additional channels there are for the supplementing of supplies. There is the Eight Hours Act. Evidently Sir Richard Redmayne does not agree with the view once expressed in the House that the suspension of the Act under the present conditions would be a formidable thing, and would create great disorganization in the coal-fields. The evidence is found in the fact that the Chief Inspector of Mines and his colleagues urge that the coalowners and their men should confer together

and determine to what extent there can be suspension of the Act. Not only do the Committee put forward this suggestion, but they offer their services in enabling employers and employed to come to an agreement. Of course, any extension of hours beyond the full working day would have to be a matter for consideration in respect of remuneration. Besides this, the Committee urge the public to economize in the use of coal, gas, and electricity. It is to be hoped this urging of economy is not going to be carried to any absurd lengths. The higher price of commodities will automatically achieve economy in use. But, after all, economy carried to unnecessary extremes in certain directions is not necessarily economic, seeing that it adversely influences employment, and the distribution of money. Moreover, in the case of gas supply, consumption has already been largely reduced by the restricted requirements for public purposes, and to some extent for private purposes by the higher price. If there is any further reduction through the preaching of economy (an economy quite unnecessary if miners would only work full time), there will be a proportionately less quantity of coal carbonized; and to that extent, therefore, so much less tar and gas will be available for the production of the constituents necessary to the manufacture of high explosives and the supply of the raw materials needed by the dye industry. At the same time, the Committee are not altogether oblivious to the influence of the industries upon the fortunes of the country at the present time. They rightly urge that the industrial position must be maintained, and that this cannot be done if there is any further recruiting among the miners. There comes a time in recruiting when the internal position of the country may be injured by its continuance in industries requiring skilled men, and essential to the maintenance of the work of other industries. In the case of both the coal and the gas industries this time has arrived.

The present report is called "Part. I.;" and the Committee are proposing to let the country shortly have their views on other subjects that are now under consideration. Among these is the one as to the curtailment of export from some mining centres being more detrimental to the working of the collieries than it is in the case of some other districts not so dependent upon an export trade. In this respect the Coal Exports Regulation Committee may be relied upon to exercise a wise discretion. The home demand, the country to which the coal is to be shipped, the ultimate destination of the coal, and the use to which it is going to be put must all have prior consideration to the effect upon the collieries. We are at war, and prudence must have precedence of sympathy. Another question still under consideration is the advisability of limitation of the selling prices of coal or the imposition of an *ad valorem* tax on exported coal, with a view to meeting the possible inequalities arising from a great restriction of export in respect of some districts as compared with others, and retaining as large a quantity of coal for home consumption as is necessary. Apart from these deferred matters, the report is a very practical one. It clearly presents the coal position; and it distinctly shows how the position can be bettered and secured for the future.

London Gas-Works and Munitions of War.

Everybody is talking of munitions to-day. They are being talked about in the Houses of Parliament; the Minister of Munitions is travelling the country enlisting the services of manufacturers, men, works, and plant for their making; they are being talked of in the newspapers, in train, and, in fact, wherever and whenever men meet. In short, munitions are, next to the actual warfare, the topic of greatest prominence. It is freely and publicly admitted that our men at the front require more high explosive shells; and no one to-day speaks in bated breath of toluol as though the Germans had not been producing it for years in excess (as seen by the export returns) of their requirements in preparation for a lavish expenditure of high explosive shells and bombs in the great war which they had been anticipating. There is not much that the Germans could be told about toluol and the methods of recovery that they do not already know. While not publishing statistics, and while refraining from disclosing all that is being done, the absurdly secretive stage in this matter has been passed. The facts are not now hidden that gas-works are busy with toluol recovery, and that certain members of the gas profession are, in different sections of the country, actively working for the increased output of toluol, and seeing that the operations for its recovery are being efficiently conducted. Everybody who can help in providing what our men at the front specially require is willing, *amor patriæ*, to do so. Now that the country knows what is wanted, the country is eager for its vast resources to be devoted to meeting the want; but these vast resources must be organized on a proper basis. Hence the formation of District Committees for the purpose. London has been called upon to do its share. Here, as in other parts of the country, there is no time, complying with the necessity for an immediate increase of supplies, for the erection of special factories; and so existing workshops, with their machine tools, furnaces, and other equipment, are being diverted from their ordinary peaceful purposes to the production of materials of war. Gas-works have some of the best equipped workshops to be found anywhere in connection with manufacturing establishments whose productions are not engineering, but whose processes are; and to gas-works (among other manufactories) the country is to-day looking for aid beyond the large part they are performing in supplying the ingredients for high-explosive purposes. Of course, this aid will be rendered to the extent that the maintenance of the efficiency of gas-works will allow. The general efficiency, however, must not be disturbed, if the works are to render of their best in serving the country in other ways.

In London, the movement for the establishment of a Munitions Works Committee had its genesis, we believe, with Mr. W. A. Harper, of the firm of Messrs. Harper, Bros., and Co., who are Consulting Electrical Engineers. His scheme contemplated that "the workshops and stations of "all companies and public authorities—light, power, water, "and gas companies—should be placed under one central "administration, and arranged in groups for the produc-"tion of munitions of war." This is rather vague; and interpreted literally it is a remarkably tall order. A central administration interfering with the conduct of gas-works would, we are afraid, do more harm than good in the very direction in which they are required to be of the utmost special service. However, the scheme has now passed beyond the stage of a mere proposal, and is being set on the high road to fulfilment, with men of weight behind it, and with (we believe) the approval of the Government as well as the War Office. The first serious step in the matter was taken at a meeting held at the Institution of Civil Engineers, when the President of that august body (Mr. B. Hall Blyth, M.A.) consented to become the Chairman of the Committee; and Mr. J. W. Restler, the Chief Engineer of the Metropolitan Water Board, the Vice-Chairman.

Quite a large Committee has been appointed—too large in fact, through the inclusion in it of an unnecessarily large number of electrical engineers. The London Gas Companies (although so much is expected from them of a nature, in connection with the production of munitions, that cannot be rendered by any other class of factories in London) were not, so far as we are aware, invited to be represented at the Institution of Civil Engineers. But since then Sir Corbet Woodall and Mr. D. Milne Watson (General Manager of the Gas Light and Coke Company) have been asked to become members of the Committee, and have agreed to do so. If there are other representatives of the gas industry on the Committee, we have not succeeded, up to the time of writing, in ascertaining their names. Among other members of the Committee are Professor W. C. Unwin, the President of the Institution of Mechanical Engineers, and Sir John Snell, the President of the Institution of Electrical Engineers. [Where is the Institution of Gas Engineers?] The War Office is represented by Captain Sankey; and the London County Council by Mr. A. L. C. Fell, the Manager of the London Tramways. Among the electrical members we see the names of Mr. Frank Bailey (City of London Electric Company), Mr. G. W. Partridge (London Electric Supply Corporation), and Mr. H. W. Bowden (South Metropolitan Electric Light and Power Company). Mr. F. J. Walker, of the St. James's and Pall Mall Electric Light Company, is the Hon. Secretary to the Committee.

The first step that has been taken by the Committee is the practical one of investigating the exact extent of the workshops and plant available in the Metropolitan area. The circulated questions seek information as to the dimensions of workshops, the room at disposal for extensions, the number of men at liberty, whether the works possess a foundry and hydraulic power, and whether there is access by rail and water. The responses to the inquiries are, it is understood, of a very satisfactory nature; it being estimated that in the London area alone there will be about 100 workshops available, in addition to those already engaged on War

Office and Admiralty work. This mobilization of the suitable productive forces of the Metropolis should make a substantial contribution to the special munitions work that is being undertaken in other parts of the kingdom. The fact that the London Committee includes men of such high distinction in the engineering world ought to make the new project of considerable value to the Government and the country, and help to give an impetus to similar movements, if such an example be required, wherever serviceable aid can be rendered.

A stupid report got abroad (probably in consequence of the formation of this Committee), and was published in various London, financial, and provincial papers, to the effect that the Government had arranged to take over the business of the Gas Light and Coke Company. The "Manchester "Guardian" made the very safe statement that "apparently "there will be no change in the method of working the "concern." It then went on to remark: "The operations "will resemble the Government control of the railway "system." "An important object," it was said, "is to "ensure a ready supply to the Government of the bye-"products of coal," although, it was sapiently added, "this "might have been possible without taking over the business." Just so. It was further remarked that "the price of the "stock did not improve on the statement—in fact, it was "quoted lower, which indicates perhaps that the market "was sceptical." Of what? Of the Government contemplating such a foolish project?

"Field's Analysis" of the Gas Business in 1914.

THE issue of "Field's Analysis" by the compiler, Mr. William Blakey, the Accountant to the Gas Light and Coke Company, suggests a little dip into some of the figures to see how the London Companies, the Suburban Companies, and the Provincial Corporations and Companies compare in respect of their gas business returns in 1914 with those for 1913, when there were no war months, and things other than in the residuals markets were nearer normal state. Only two or three points can be touched here, as "Field" is such a wealthy mine for comparative work that one could go on contrasting this and that almost *ad infinitum*. Making examination by all the standards of comparison that can be applied, there are good indications that the Provincial Corporations included in the "Analysis" are, taken as a whole, improving their gas-sales position, and this even if Widnes be eliminated, which concern has thrown its weight into the balance on the side of the Corporations, and has made some of the figures of the other Corporations look even uglier than before. Belfast is also a new comer. But we have not taken Scotland and Ireland into consideration in the few comparisons instituted here.

Although financially the outcome of the year's trading was anything but what the proprietors of the concerns generally would have preferred, still, considering the existence of the five months of war and all the dislocation of business conditions that they produced, it is easy to peer behind the figures, and conclude that, had the war not intervened, the position of the undertakings would have been much strengthened during the year. Taking the three London Companies, it is seen that at Dec. 31 they had 1,283,278 private gas consumers on their books, or 26,687 more than a year previously. In 4223 miles of mains, they had an increase of 21 miles; and the average number of consumers per mile of main rose by five, to 304. The eight Suburban Companies enlarged their number of consumers by 26,064 to 417,696. By laying an additional 107 miles of mains, they ended the year with a total mileage of 2047, over which the consumers averaged 204 per mile, or two more than at the end of 1913. In the case of the eleven Provincial Corporations, the total number of consumers was raised by 25,027 to 902,293, of which former figure Widnes accounts for 7934. By the addition of 135 miles (of which Widnes contributed 52 miles), the mileage of mains for the Provincial Corporations went up to 5004. But the consumers per mile remained stationary at 180. The nine Provincial Companies raised their total of gas consumers to 493,313, by connecting-up 13,742 new ones. Their mileage of mains was only extended by 44, raising it to a total of 2810; while the consumers per mile of main averaged 176, being an improvement of three.

This is all satisfactory; and there are other supplementary indications of fundamental expansion. Take the number of stoves on hire. In the case of the three London Companies, by an accretion of 56,242 during the year, the number of stoves on hire was raised to 1,071,817. In the case of the eight Suburban Companies, by an addition of 38,392, the number of gas-stoves on hire rose to 351,271. The eleven Provincial Corporations (the opportunity of some of them being of a roomy nature through past reticence in this business) did well; their number of stoves on hire being increased to 444,632—a gain of no less than 102,179. This is not the only sign of a larger commercial activity on their part, although there are still some of them who sadly want their torpor violently disturbed. The nine Provincial Companies only added 19,206 stoves; making the total 292,493. A spot of particular weakness with the Provincial Gas Corporations is the average consumption of gas per consumer. This is very largely due to the atrociously bad showings of certain of them, while others can boast of some of the very finest averages in the kingdom for individual concerns. In London, last year the average consumption per ordinary consumer was 66,191 cubic feet, which was a recession of 2219 cubic feet. In the suburbs, the average per ordinary consumer was 51,265 cubic feet, or an improvement of 299 cubic feet. By putting on 938 cubic feet, the Provincial Corporations raised their average per ordinary consumer to 41,699 cubic feet, which (seeing that so many of them are operating in crowded industrial cities and towns) does not compare well with the other averages. In the case of the Provincial Companies, the average per ordinary consumer was 47,205 cubic feet, or an increase of 360 cubic feet. The average per prepayment consumer in London was 16,472 cubic feet, and in the suburbs 18,047 cubic feet. These figures are about the same as in 1913. Some of the Provincial Corporations seem to have been showing good energy among their prepayment consumers, for the average has risen by 1289 cubic feet to 14,448 cubic feet, which is still not a figure about which there can be much boasting. There are yet some concerns whose averages suggest that the application of high explosives is required to shatter the traditional policy, and so make way for a new trading policy. The Provincial Companies also fattened their average for prepayment consumers by 853 cubic feet—making the average 15,157 cubic feet.

One cannot, especially under the circumstances of the year, make comparisons between different parts of the country, as social and industrial conditions vary greatly according to geographical situation. But, of course, the gas undertakings in some provincial industrial centres benefited considerably by the war in respect of gas consumption. The Metropolis was not so favoured. The 43,384,651,000 cubic feet sold in London last year was less than in 1913 by 537,540,000 cubic feet, of which private (largely shop) consumption was responsible for 394,887,000 feet, and restricted public lighting for the balance. The gas sold per mile of main in 1914 was 10,273,000 cubic feet, or a reduction of 180,000 feet, notwithstanding the excellent accretion of connections. London in respect of its gas sales appears to have been punished more than any other quarter of the country. In the suburbs of London—of course, we are taking the complete year, and cannot tell what a whole year under war conditions would produce—the gas consumption in 1914 increased to 13,300,607,000 cubic feet; the expansion being 758,414,000 cubic feet. This was all due to private consumption; for the public lamp requirements showed a decline (through the restrictions) of 15,073,000 cubic feet, so that the private consumption of gas was actually higher by 773,487,000 cubic feet. Per mile of main in the suburbs, 6,498,000 cubic feet were sold, or 33,000 cubic feet more than in 1913. Coming to Provincial Corporations, Widnes intrudes and interferes with comparisons. However, as further testimony to activity in gas sales developments in local authority areas, we have the substantial fact of an advance of 1,564,457,000 cubic feet in a total of 29,332,591,000 cubic feet, which figures for comparative purposes require 470,306,000 cubic feet deducted on account of Widnes. The Provincial Corporations included in the "Analysis" do not appear to have troubled much about lighting restrictions; seeing that they consumed an additional 85,276,000 cubic feet for the purpose (less 16,421,000 on account of Widnes). Their private patrons also accounted for new business to the amount of 1,479,181,000 cubic feet (less 453,885,000 cubic feet for Widnes private consumers). Per mile of main, the local authorities raised their sales by 159,000 cubic feet to 5,862,000 cubic feet. In the Provinces where the gas business is carried on by companies, there the local authorities brought down the amount of the public lighting. Conse-

quently, whereas, for the nine Provincial Companies named, the total sales of gas were 17,523,255,000 cubic feet for the year, or 660,127,000 cubic feet more, the public lighting requirements were 27,426,000 cubic feet less, and those of private consumers 687,453,000 cubic feet more. The average sale per mile in their case was 6,236,000 cubic feet, or 139,000 cubic feet more. We will not say anything regarding the gas and residuals receipts and costs of coal and oil, though they invite consideration.

In conclusion it must be said that, in view of the conditions ruling during the best part of the second half of the year, the gas business outside London proper, taking only the areas covered by the "Analysis," was not at all bad, taking a full year's view. The better showing, too, in the municipal gas sales position generally, bearing in mind that some municipal gas departments stand as good as any in the country in relation to the best standards of working and trading, is quite a feature of the "Analysis," and deserves recognition accordingly.

The "B.C.G.A." Recruiting Campaign.

In the cause of co-operative work, representatives of the gas industry were very busy last Wednesday. There was the conference at Westminster with members of Parliament on the subject of coal, which conference is referred to in an editorial article in earlier columns; and there was the recruiting meeting at Blackburn for new subscribers to the British Commercial Gas Association. A report of the proceedings at Blackburn is published in this issue. The Manchester district embraces, according to Mr. J. G. Newbigging, the Chairman of the District Committee of the Association, 202 undertakings; and of these 58 per cent. are non-subscribers. Nevertheless, not a very great number of the non-subscribing gas concerns accepted the invitation to have representatives present at the meeting, to hear the case in favour of united action as put forward by Mr. F. W. Goodenough, as well as the testimony of Mr. Newbigging and others. Why this disinclination to hear the truth as to the benefits of united action, while knowing that the benefits are being universally enjoyed at the expense of the existing subscribers? Attendance at the meeting did not involve compulsory enlisting in the ranks of the organization; but attendance might have given representatives who were not there, as it did those who were there, new light—light from experience—on what is now quite an old subject. It should be realized that the limits of the Association's activities, in whatever (either known and unknown) lines of publicity work they engage are set entirely by the amount of money subscribed. Money is their ammunition; and the Executive Committee know that beyond the limits of their present operations there is much valuable work to be done, if only the ammunition is provided. It is to the non-subscribers they must look for this; and of the fairness of this, we cannot help thinking the non-subscribers are fully conscious. However, though the number of representatives of non-subscribing undertakings attending was not great, the representatives of organized publicity had the satisfaction of knowing that they did succeed in enlisting the sympathy of several of the delegates, and that from them recommendations will be made to their respective committees and companies, with, we hope, the success that is desired.

Figures of Local Authorities.

The news columns of this and last week's issues of the "JOURNAL" have added further particulars to those already published with regard to the operations of municipally-owned gas undertakings during the financial year lately completed. When the annual report of the Gas Committee was presented to the Birmingham City Council, it was remarked that the output of gas indicated the prosperous condition of trade in the city; and this output is still being maintained at a considerably higher figure than at the corresponding time last year, notwithstanding the reduction in public lighting. The sales of gas increased in the period dealt with by no less than £20,000, though this gain was balanced by a falling-off to the same extent in the receipts from residuals, in spite of the larger quantity of coal carbonized. There was a gain of about 2¾ per cent. in the quantity of gas sent out at Chesterfield; the make constituting a record for the undertaking. Statistics indicate that extremely gratifying progress has been made in all directions since the works have been in the hands of the Board. The report from Cockermouth, too, is an excellent one. Here an increased make of gas per ton has led to a notable reduction in the quantity of coal carbonized; and there is an additional profit on the twelve months' working of £147. In this case, the gas-works were taken over by the Local Authority somewhere about twenty-five years ago; and nearly every year since has seen an increase in the quantity of gas made. As it has been seen in Cockermouth that reductions in the price of gas in the past have led to increased sales, it is felt that an increase in price would naturally retard the sales; hence there is a wish on the part of the Council (in which the consumers will certainly share) to avoid if possible any rise in price. Whether or not they will be successful in this, depends, it is admitted, on the contribution that is required in aid of the rates. In addition to the falling-off in the returns from residuals, Coventry has suffered from loss of revenue consequent upon a reduction which was made, before present unfavourable conditions developed, in the price of gas to prepayment consumers. The remark was made in the Council, when referring to the large sum that has during the past thirty years been handed over in relief of the rates, that half this money should have been kept in reserve, "so that in a time of difficulty like the present they would be able to face the future with equanimity."

The Year's Working.

Congratulatory remarks on the results of the year's working were made when the report regarding the Hinckley gas undertaking came before the Council. A larger quantity of gas was sold; and the satisfactory financial position of the concern was attributed chiefly to the policy of the Council for many years in paying off all capital expenditure out of profits. Some pertinent remarks in the Ilkeston Town Council led to the withdrawal for the time being of a recommendation by the Gas Committee that the price of gas should be increased. It was pointed out that the proposal, which would enable further profits to be applied in relief of the rates, would benefit most the larger ratepayers; and that as for the past thirty years consumers had been charged a price which had permitted of large surpluses being applied in relief of the rates, they were now entitled to consideration. Consumption has been well maintained at Rochdale; a substantial falling-off, owing to the restrictions in force, in the quantity of gas used for lighting having been more than compensated for by increased sales for other than lighting purposes, which now represent over 33 per cent. of the total amount sold to private consumers. The adverse factors at Stockport included—in addition to a decreased yield from residual products, an increase in the price of coal, and higher wages—a falling-off in the gas consumption. The trifling decrease of £70 in the income at West Bromwich must be regarded as quite a fair result, taking into account all the unfavourable circumstances which have influenced gas-works in the past twelve months. As a matter of fact, the net profit shows a slight increase on the preceding year, in spite of the circumstance that the undertaking has been faced with heavy expenditure in all departments, in the shape of repairs and new plant. Apart from these items, too, there have been substantial increases in the form of interest and sinking fund charges, and other expenses, which, with the reduced returns from residuals, have affected the result. The increase of about 8 per cent. in the sales of gas is said to have been the largest yearly increase in the history of the undertaking. Notwithstanding the war, the results obtained at Workington are stated to have been the very best recorded for the works. Less coal was carbonized, but a larger make per ton resulted in a bigger total yield; and there was an increase in all classes of consumption.

Blame the Gas Company.

The Dundalk Gas Company are putting up a good fight against the electric light in Dundalk, as might be imagined would be the case with Mr. George Airth leading. But as a result of the business competition, no matter what goes wrong now in the District Council, the Gas Company are always supposed to be at the bottom of the mischief, though perfectly innocent of it. The absurd length to which the Council go in this belief was well illustrated by a case at the Dundalk Petty Sessions last week. It was instituted by the Local Government Board against the Council for the recovery of £63 2s. 9d. which had been surcharged as having been illegally paid as poundage fees to the poor-rate

collector. The proceedings, however, fell through on a decision of the Bench that the summonses were defective—defective on the ground that some of the members of the Council were not included in them. The Chairman of the Bench, however, dissented from the view of the other justices. But the amusing point is that the Council's legal representative appeared to be persuaded that the Gas Company supplied the motive power that set the Local Government Board in action; so much was he so persuaded that he asked that, if there were any shareholders of the Gas Company on the Bench or any Freemasons, they should retire. This was probably a mere formality on the lawyer's part, for the justices in the result were found to be anything but unfriendly towards the Council. Even the Government were accused by the legal gentleman (according to the report in one local paper) of being "worked" by the Dundalk Gas Company. This should interest the Prime Minister and his colleagues. In connection, too, with a settlement suggested by the Bench, the Council's representative expressed the opinion that to effect a settlement the Gas Company's solicitor would have to be brought in. So the signs of a waspish hatred continued. The next thing we suppose that will be heard of is that the Dundalk District Council have had a "Hymn of Hate" published, in which will be the hope of a fearful punishment falling upon the Company. If the local governing body had an eye to the best interests of the town, it would recognize that the Company are public servants, have a right to existence, and also a right to legitimately compete without any display of foolish temper and hostility by the Council.

"Idle" Capital for the Wilts Company.

The Company with the big sounding title—the Wilts County Gaslight and Coke Company, Limited—it will be remembered, is one of the progeny of the United Gas-Works Development Company, Limited. The "County" Company's works are situated at Pewsey; so that the area occupied in the county is not a large one. There has been in our columns criticism of the concern, of the prospectus, and of the report as to the prospects of the Company by the "Gas Consulting Engineer," Mr. George A. Smith; and the criticism was not at all favourable. There is little doubt that the United Gas-Works Development Company could, if they chose, unearth not a few of the shares representing the £30,000 capital mentioned on the prospectus. A circular-letter by Mr. William Judd, the Secretary, has been sent out to investers, in which he suggests that one of the "present owners" of shares is compelled to part with them "at a sacrifice." Of course, our sympathies are with this hard-pressed owner. The number of shares is 35; and, according to the prospectus, dated twelve months since, they were issued at par. The pressure on this "owner," and his views as to the value and prospects of the shares, are well shown by the fact that, "in order to facilitate a sale," he is willing to part with the shares at £4 10s. each, and to allow the "dividend" payable next month to be deducted from the purchase price. The dividend due will be 3s. 8d. per share (at the rate of 8 per cent. per annum, less income-tax); so that the shares are for disposal at £4 6s. 4d. each. We make out that this would total to £151 1s. 8d.; but the hard-pressed owner seems willing to sacrifice something more, as he is prepared to take £147 12s. for the 35 shares.

The Dividend and the Prospects.

About the half-year's dividend at the rate of 8 per cent. per annum, this may be the last that will be going the way of the "investors"—at any rate, for some time. Those excellent promoters, the United Gas-Works Development Company, announced in the prospectus last June that they were so assured of the prospects of the Company that they were going to guarantee payment of a dividend on the preference shares of 7 per cent. for the first year, and a dividend on the ordinary shares of "not less" than 8 per cent. for the same period—the "period" is up this June. Mr. Smith, "Gas Consulting Engineer," seemed to indicate that the shares would be, after developments of plant and district, good for 15 per cent. per annum. As we read this, and think of what the hard-pressed "owner" is giving up, and of the sacrifice he is making, our sympathy expands. Yet, notwithstanding Mr. Judd's suggestions to the recipients of his circular-letter—that "the offer is certainly worthy of your consideration," that the "facilities at the present moment for investing in home industries are limited," and that "for capital lying idle, this offers an exceptional opportunity to investors"—we advise them to leave these 35 shares safely with the owner. It would be a pity if, later on, he had to regret that he parted with them with unnecessary haste.

The "United," &c., Company and Aladdin's Lamp.

In connection with the foregoing, the information is interesting that the Mutual Industrial Corporation, Limited, have just figured in the Bankruptcy Court. The official statement of affairs shows gross liabilities amounting to £6648, of which £6582 is expected to rank against the estate for dividend. The sum of £99 17s. 9d. represents the assets, so that the deficiency is £6482. The paid-up capital of the Company being £5507, the total deficiency is £11,989. Among the objects of the Company were the formation of public or private companies, and the carrying on of a gas-works company in all its branches. The primary object of the Company, it appears, was the acquisition of a company-promoting business carried on by H. H. D'Aeth and J. Gordon, under the style of Hughes, Gordon, and Co. The issued capital was £5507. The point of interest to our readers is how the money was subscribed. Here is the statement: United Gas-Works Development Company, Limited (of which Company, be it noted, D'Aeth and Gordon are, it is stated, the principal shareholders), including the seven signatories' shares, £4507; H. H. D'Aeth, £500; and J. Gordon, £500. It seems from the report that the United Gas-Works Development Company have been interested in the renting of the London Opera House, with the object of producing Oscar Barrett's pantomime "Aladdin." The venture only continued from Dec. 26 to Feb. 6, and resulted in a large loss. The fact that Aladdin became possessed of a wonderful lamp does not perhaps make the interest of the United Gas-Works Development Company in the theatrical venture so grotesque as it might otherwise appear; but the money advanced in this piece of enterprise has not assisted in the Company's financial "development."

Consultants' Association.

The Association of Consulting Engineers again draws attention to itself through the Committee's annual report. It is an organization of very slow growth; and the less said about its representativeness the better. It has a total membership of 74, while the number of consulting engineers of the country in all lines would require some counting-up. In the list of members, only two names identified with the gas industry are noticed; all the consultants who are not in the list see no use in this protective body. Numerically, and as representing the consulting profession in civil and special lines of engineering, the Association is a failure. Its work in the past year has not been of anything more than commonplace importance. The Committee state that material advantage has accrued in collating information upon matters of everyday interest to consulting engineers and affecting the interests of their clients, due to the fact that the London members have had the advantage of the presence on the Committee of various able and influential members from all parts of the United Kingdom. We have looked down the names of the constituents of the Committee, to ascertain what they mean by praising up their own composition. Of course, the London members of the Committee are as honest as the day is long; but the Provincial ones had better have a care as to what they give away.

Other Matters.

The Committee also desire the members to take them into their confidence on matters on which they require counsel. Consultants consulting consultants constitutes a process that seems to be somewhat anomalous. The Committee say, in this connection, that matters come before them of a more or less private and confidential nature. They do not further indicate the character of these matters; but they take credit to themselves for having dealt with them in a suitable manner. We could name firms of consulting engineers who would not be prepared to place before the Committee questions of a "more or less private and confidential nature." Among general matters, a Sub-Committee has considered the "Model General Conditions of Contract" prepared by the Institution of Electrical Engineers, and does not recommend them for adoption by independent consulting engineers. It is rather a nice point as to how far an Institution such as that of the Electricals are prepared to have their work revised by an Association of Consulting Engineers, particularly by a body

that cannot claim to be wholly representative. The Committee pat themselves on the back for their revised "Book of Professional Rules and Practice of Members," with a scale of fees for general practice. Two other paragraphs in the report show that the Committee (like the Institution of Civil Engineers) have set their faces against members replying to advertisements for professional services, and against entering into competitions for engineering schemes.

PERSONAL.

Mr. H. C. PAGE has been appointed Chief Engineer to the Canterbury Gas and Water Company, and Mr. W. E. SWINNERTON (Assistant Water-Works Engineer under the late Mr. T. Buckley) has been advanced to the position of Resident Water-Works Engineer at Canterbury.

Mr. A. P. GHENT, of Matlock, has been appointed Secretary and Accountant to the Sittingbourne District Gas Company. He has been closely connected with the formation of various Peakland gas companies, including Chapel-en-le-Frith, Whaley Bridge, Baslow, Matlock, and Churnet Valley.

The position of Superintendent of the Bracebridge works of the Lincoln Corporation Gas Department has been secured by Mr. REGINALD BOWDEN, who has for the past five years been Carbonizing Superintendent at Stockport. Mr. Bowden received his early training under Mr. Frith, at Runcorn, and was afterwards for more than three years with the Whitehaven Gas Company as Assistant.

Private R. J. SMITH, of the East Lancashire Regiment, has been recommended by his Commanding Officer to the Brigadier-General for conspicuous bravery on the field. Private Smith was employed at the Darwen Corporation Gas-Works as a fitters' labourer for a considerable period up to the outbreak of the war. His time as a reservist of the R.A.M.C. expired about a fortnight before war was declared; but he enlisted on the first day of the war. His friends, in their letter home, say that he has earned distinction several times by his bravery—one of them stating that on one occasion he saw Smith bring in under heavy fire seven wounded Canadians.

Last Friday week a pleasing ceremony was performed at the Neepsend Gas-Works, Sheffield, in the shape of a presentation of a polished oak cabinet (suitably inscribed) containing 109 pieces of Sheffield cutlery to Mr. C. S. SHAPLEY, who is leaving to take up duties as Engineer and Manager of the Southend Gas-Works. Mr. John W. Morrison (the Chief Engineer of the Company), in making the presentation on behalf of the staff and workmen, spoke of the excellent work Mr. Shapley had done at Neepsend during the last six years, and regretted his removal, although he congratulated him on his new appointment. On behalf of the Cricket Club a presentation was also made to Mr. Shapley.

Consequent on the promotion (on the death of Mr. William Fergusson) of Mr. Fred Chadderton to the position of Manager of the Barrow-in-Furness Gas and Water Works, there was a vacancy in the office of Chief Assistant; and this has now been filled by the selection by the Council of Mr. J. R. BRADSHAW, who has occupied a similar position under Mr. Robert Watson, at Doncaster, since 1909. Previous to that time, he was pupil, and subsequently Junior Assistant, to Mr. Charles Harrison, the Engineer of the Gas and Water Departments at Accrington. Since he has been at Doncaster, Mr. Bradshaw has done good work, and has gained experience which should prove exceedingly useful to him, inasmuch as extensive additions have been made to the works and district plant, necessitated by a growth in the make from 233 million cubic feet in 1909 to 361 millions in the year to March last. Mr. Bradshaw holds an honour certificate for "Gas Engineering and Supply," and has also the Intermediate Degree in Science (Engineering) of London University.

From among nearly a hundred applicants, of whom four were selected for interview, Mr. F. SHEWRING, the Manager of the Droitwich Gas-Works, has been appointed Manager and Secretary to the Tawe Valley Gas Company, and will take up his duties next month. The Tawe Valley Company, with works at Pontardawe and Ystalyfera, have an output of some 50 million cubic feet per annum—nearly double the make at Droitwich. Mr. Shewring, who is in his thirty-fifth year, received his practical training in gas-works engineering and management at the Hereford Gas-Works, first under Mr. W. Parlby, with whom he served articles, and later under Mr. W. W. Townsend, now Manager to the Colchester Gas Company. It was during 1908, after spending twelve years at Hereford, that Mr. Shewring received the Droitwich appointment; and under his management he has had the satisfaction of seeing the output of gas and the annual profit largely increase, while the price of gas and the leakage account have been substantially reduced. At the meeting of the Lighting Committee last week, Alderman Gabb (the Chairman) said they much regretted that Mr. Shewring was leaving them. At the same time, they congratulated him on his new appointment, in which they wished him every success.

At a meeting of the Rochdale Corporation last week, Mr. JAMES B. STEWART, District Superintendent of the Street Mains Department at Glasgow, was appointed Distribution Superintendent for the Borough of Rochdale. Mr. Stewart served a regular apprenticeship with a Dundee firm, and afterwards obtained drawing office experience. From Dundee he went to Glasgow, where for about two years he was employed in the Anchor Line Engineering Workshop at the erection and upkeep of producer gas plant and gas-engines. Then he went to the Glasgow Corporation Street-Mains Department, as District Superintendent of Mains and Services. Here he has had for the last twelve years a very large and varied experience in the work of the department. A correspondent who knows him writes: "His tactful manner, combined with his thorough knowledge of his work, has contributed materially to the keeping down of gas consumers' complaints, about which the General Manager is so proud. Such services are as invaluable as the remuneration for them is inadequate; and it reflects no credit on the Glasgow Gas Committee that the services of such men as Mr. Stewart cannot be retained. Doubtless, had he been a clerk, with neither practical nor technical training, the Corporation would likely have seen fit to give him a £60 or £70 a year increase."

Out of a short list of five candidates, the Corporation of Airdrie have appointed Mr. JOHN W. M'LUSKY (Manager to the Portrush Gas Company) as Manager of their gas undertaking, in the place of Mr. Dugald Currie, now of Nelson. Provost Frew, intimating to Mr. M'Lusky his appointment, offered his warm congratulations. He said the Council had been very successful in the last man they obtained from Ireland (Mr. Currie having come from Belfast); and if Mr. M'Lusky proved the same as Mr. Currie, they would have every reason to be pleased with the appointment they had made. He wished Mr. Currie every success. Mr. M'Lusky, in acknowledgment, said they would get the very best that was in him for the success of the undertaking. The new Manager is a native of Port Glasgow. He has had a wide and extensive training in gas manufacture, distribution, design, and erection of plant, and holds certificates in mechanics, building construction, drawing, and chemistry, and first-class honours from the City and Guilds of London for gas engineering. In 1906-8, he was Superintendent of the Barking Gas Company, and then supervised the production of coal gas and water gas, and the working up of bye-products. For the following three years, he was Assistant to Mr. J. H. Cornish, at the Bridgwater Gas-Works, and helped in the preparation of plans and specifications for extensions and improvements on the works, which were carried out under his supervision. In 1911 he was appointed to his present position at Portrush, where he carried through an extension of the retort-bench, installed new exhausting plant, and effected alterations and improvements to the purifying apparatus.

OBITUARY.

The death took place at Bodmin last week, at the age of 96, of Mr. A. C. SANDOE. Deceased was at one time a Director of the Bodmin Gas and Water Companies and of the Fowey Gas Company, and Chairman of the Fowey Water Company.

The death is announced of Mr. CHARLES COLSON, late Deputy Civil Engineer-in-Chief to the Admiralty. The deceased gentleman (who was the eldest brother of the late Mr. Alfred Colson, of Leicester) was born in 1839, and was the son of the late Mr. Henry Colson, of Ringwood, Hants. He was the Senior Assistant Civil Engineer at Portsmouth Dockyard from 1881 to 1883, and filled several similar posts until the year 1905, when he retired.

German Association of Gas and Water Engineers' Meeting.

The announcement is made in the "Journal für Gasbeleuchtung" of the 15th ult., that the Council of the German Association decided at a meeting held on March 22 that the proceedings at the annual meeting of the Association this year should be limited to the transaction of formal business, and that no papers should be read at, and no festivities arranged in connection with, the meeting. The meeting was originally fixed for the 28th to the 30th inst.; but it is now agreed that the necessary business can be carried through in one day, and a subsequent announcement will be made as to the date selected.

Further Lighting Regulations.—An Order in Council just published makes further regulations for the defence of the realm. These extend the power given to the Secretary of State under section 150 of the Factory and Workshop Act, 1901, to exempt from the operation of the Statute factories employed during "public emergency." The section referred to factories belonging to the Crown; and these regulations provide that the exemption shall apply to factories in which there has been a loss of men through enlistment or transference to the Government service. There are also new rules for the control of lighting. The Secretary of State may order that all lights shall be extinguished or obscured between any hours and within any area; and if no police constable is available to see that the order is obeyed, "any soldier or sailor on sentry, patrol, or other similar duty" may enter premises or stop and seize any vehicle to extinguish or obscure the lights.

GAS COMPANIES AND COAL SUPPLIES.

The Deputation to Members of Parliament.

As had been arranged, a deputation of forty-two gentlemen, representing the gas and electricity undertakings of the country, last Wednesday afternoon met at the House of Commons about two hundred of the members, in order to discuss "the serious difficulties in which they found themselves owing to shortage of coal." Lord Claud Hamilton presided.

Among the deputation representing the gas industry were: Sir Corbet Woodall, the Governor, and Mr. D. Milne Watson, the General Manager, of the Gas Light and Coke Company; Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Gas Company; Mr. W. G. Bradshaw, the Chairman of the Commercial Gas Company; Mr. John Bond, the President of the Institution of Gas Engineers, who were also represented by Mr. W. E. Price, the Hon. Secretary, and Mr. W. T. Dunn, the Secretary; and Mr. F. E. Cooper, the Secretary of the Gas Companies' Protection Association. Also included in the deputation were the following representatives of gas companies and corporation gas departments: Sir J. Fortescue Flannery, Bart., M.P. (South Suburban), Mr. Edward Allen (Liverpool), Sir Joseph Bellamy (Plymouth), Mr. H. E. Jones (Wandsworth), Mr. Reginald Neville, M.P. (Brentford), Mr. Alderman W. Kay (Manchester), Mr. Alderman F. S. Phillips (Salford), Mr. Hanbury Thomas (Sheffield), Bailie Irwin (Glasgow), Mr. A. Masterton (Edinburgh), Mr. James Smith (Belfast), Captain R. S. Hilton (Birmingham), Sir D. Ford Goddard, M.P. (Ipswich), Sir Ryland Adkins, M.P. (Herne Bay), Mr. J. F. Bell (Derby), Mr. J. R. H. Jacobs (Southampton).

The speakers were: Sir Corbet Woodall; Sir John Snell, the President of the Institution of Electrical Engineers; Mr. Alderman Kay; Mr. Frank Bailey, Joint Managing-Director of the City of London Electric Lighting Company; Mr. Charles Carpenter; Bailie Irwin; and Bailie W. B. Smith, the Convener of the Electricity Committee of the Glasgow Corporation.

The deputation was sympathetically received, and the members of Parliament made arrangements to discuss the subject further at a meeting of members of the House to be held some time during the present week.

[The conference was referred to by various members in the course of the debate in the House on Thursday night—see "Parliamentary Intelligence," pp. 655-6.]

ELECTRICITY SUPPLY MEMORANDA.

In a newspaper a few days since, we came across the confession of a medical man who had been a drug-taker, and who had committed suicide, that he had been "a fool at the wrong time." We have just been reading an article (for which there is editorial responsibility) in the "Electrical Supplement" to the "Electrician" the final words of which are: "What we should like to see is an organized effort made to remove gas from an industrial sphere in which its employment is both uneconomical and deleterious to the health of factory workers." It is only fair to state, however, that there are indications in the former parts of the article that the writer has come to the conclusion that fields for electric heating in our factories are few and far between. However, the quoted words are written at a time when there has never been greater evidence of the popularity of gas in manufacture as an economical heating agent, owing to the economy of time as well as of works' costs that it produces through its ability to speed-up output. The gas-furnace makers have been, and are, working hard to meet the demand. There has been pressure for gas apparatus for clothing factories, and for all sorts of operations from the making of the buttons and badges for uniforms and caps up to furnaces for the production of shells weighing a ton apiece, and an innumerable range of work between. For these things, the manufacturers are not turning to electricity. They would laugh boisterously if they read the quoted words, and applied them to their own work, of the electrical enthusiast and optimist who has never had practical experience of the various operations upon which they are engaged, and who obviously knows little of the limitations even of electricity or of the infinite capacity of gas as a heating agent. The new Minister of Munitions has been going about the country beseeching manufacturers and their men to speed-up their works and their output—not to evict something that assists them in the work, and to adopt a substitute that would only retard it.

Foolish at the Wrong Time.

By the way, the enthusiasm and optimism of the electrical writer whose words are quoted above seem to have originated in the conversion, in one factory, of the heating of dies from gas to electricity, which is a comparatively small operation. We think this is the Wimbledon instance referred to in a note, side-headed "From the Sublime to the Ridiculous," in the "Memoranda" for May 11 (p. 323). He now says "the girls had to work *directly over* the *fumes* emitted by open gas-burners. . . . The foremen were always in doubt as to what number of girls would turn up to work in the morning"—a state of things which the adviser of the professional men of the electrical industry and of the factory owners of the country appears to think was really due to the "depressing influence and general debilitating effect of gas-fumes in a workshop." We would suggest, if this note should meet the eyes of the gas suppliers in the Wimbledon area that they should look into this case, and the allegations. There seems to have been a misapplication of gas in the methods of the workshop in question, or defective conditions in the worshop, if the girls had to work "*directly over* the *fumes* emitted by open gas-burners." By the way, Mr. J. F. Shipley recently made a very similar statement concerning a Luton straw-hat factory. He has since had to apologize and withdraw the statement. The Luton straw-hat factories can work with gas without "poisoning" ten or twelve girls per day, and so can other factories. It is about time, with all the excellent experience at the command of the gas industry and of the manufacturers of the country, that electrical writers gave up indulging in such foolish talk. There is no reason why in every operation the benefits of the heating properties and economies of gas should not be realized, without detriment to anyone. Where they are not gained without detriment, then there must be defective application; and no engineer worthy the title—whatever electrical press writers may say who have not the necessary technical qualification to enable them to know better—would admit an incapacity for applying the gas in a manner that would be perfectly innocuous. There is plenty of room for business for electricity where scattered motors and electric tools are serviceable in the operations of industry. There is plenty of room for business for the gas industry and the electricity industry in the manufacturing world. But when we read such a weakly and flabby statement as this: "What *we* would like to see is an organized effort made to remove gas from an industrial sphere in which its employment is both uneconomical and deleterious to the health of factory workers," we are moved first to laughter, and then to pity for the responsible individual.

The Pity of It.

The users of Diesel engines for generating electricity (or for any other work) are not having a happy time of it just now, owing to the price of the fuel oil. The Kingston-on-Thames Town Council have entered into a contract for 1400 tons of fuel oil for two years at 65s. per ton, *plus* freight from Purfleet of about 3s. 6d. per ton—making 68s. 6d. per ton delivered at Kingston. But we take it this is only on the river; not into the tanks at the station. This offer, it was stated at a recent Council meeting, is regarded as a favourable one, seeing that there were indications that the price would not be less, but "might very well go up to 100s. per ton in a short time." The consumption of oil for these engines used to be taken as 0·45 lb. per brake horse power hour. At 40s. per ton for oil, Mr. W. J. U. Sowter some time since put the cost of fuel for the Diesel engine, working at full load, at 0·16d. per unit of energy generated, and at quarter load at 0·307d. Mr. Horace Boot gave the cost of fuel over one year's working at Chichester at 0·291d., wages at 0·543d., and repairs at 0·210d., or a total of 1·044d. per unit, without allowing for heavy capital charges and depreciation on these engines. There has frequently been warning against taking the fuel costs alone for these engines; and that was in days when the price of the fuel was only about two-thirds in some places what Kingston is now going to pay; and all electricity works are not so well circumstanced for water carriage as Kingston. The current prices for fuel for the engines, which prices promise to endure for some time, will now cause electrical engineers to look twice before adopting Diesels for generating purposes.

Diesel Engines and Costs.

Electrical consulting engineers surely think the Inspectors of the Local Government Board are a credulous and ignorant set of men; but we rather fancy that Mr. H. S. Bidwell, M.Inst.C.E., must have smiled over at any rate one statement in the evidence given by Mr. J. W. Speight at an inquiry held at Queensferry, on behalf of the Board, into an application for a loan for enabling an electricity supply undertaking to be established at Hawarden and West Saltney. Mr. Speight is the consulting engineer to the scheme; and (according to the "Electrical Times") he told Mr. Bidwell that his estimates were "based on a charge of 5d. per unit for lighting, which is the equivalent of gas at 2s. 3d. per 1000 cubic feet." After "which," the "Electrical Times" put in the words "*he* said," which words turn the laugh from our contemporary on to Mr. Speight. Let us put a few points to the latter gentleman. Is it not true that the measured average consumption of current by a metallic filament lamp may be taken at about 1·5 watts per photometrically measured candle power? We will, however, give him the advantage of a candle per 1·25 watts. This means 800 candle-power-hours per unit, and which unit he prices at 5d. Perhaps, too, he will not dispute that, at 2s. 3d. per 1000 cubic feet, 185 cubic feet of gas can be purchased for 5d. Now with the inverted incandescent (low-pressure) gas-burner, 20 candles per cubic foot of gas can easily be obtained; and therefore the 185 cubic feet will give the user 3700 candle-power-hours, against the 800 candle-power-hours for the metallic filament lamp. If 5d. will with electricity give 800 candle-power-hours, and 185 cubic feet of gas would only do likewise, then the efficiency of the inverted or any other incandescent gas-

A Flight of Imagination.

burner would be only 4·3 candles per cubic foot of gas! We invite Mr. Speight to demonstrate the accuracy of the reported statement. Meanwhile, we take the liberty of regarding the published declaration as a very foolish one.

Electric-Meter Errors.

Electric-meters are notoriously bad sinners. At various times, there has been occasion to notice how consumers have been "let in" for heavy accounts either through meter misregistration or dial misreading. At the Stoke-on-Trent Town Council meeting the other day, it was stated that mistakes had been made in the reading of certain meters to the total amount of £1000. The meters, it was said, had been read by five different persons before the mistakes were found out and rectified. But the firms concerned had agreed to pay the differences in their accounts. Coincidently with the publication of these misdeeds on the part of meters and readers, a report sees the light of day by Mr. S. Evershed, to the Engineering Standards Sub-Committee on Electrical Plant Accessories, on the difficulties that arise in testing electric-meters, owing to the variable resistance to motion offered by the registering trains of electric-meters. It appears that at any considerable load the variations in retarding movement do not appreciably affect the speed of the rotor; but in many cases the variable resistance on the meter train is sufficient to cause marked changes at loads from one-tenth downwards. The difficulty is referred to of reading the pointer dial of an electric-meter; and when the register axles are geared together with considerable back-lash, as they should be if the train is to run freely, the pointers sometimes give positively misleading indications. The reporter comments on the ambiguity of counter dials. During the time that a digit wheel in a counter is changing from one digit to the next, and particularly when several wheels are changing from 9 to 0, the reading of the dial becomes ambiguous, and remains so until the change has been completed. The periodic ambiguity is inherent in all discontinuous gears; and to avoid this a vast amount of ingenuity has been expended on subsidiary devices for compelling the counter to change more or less suddenly from one digit to the next. With the creep counter dial, when one or more nines are changing to zero, this is apt to lead to considerable discrepancies at a low load. With jump counter dials, the periodic changes due to the rising and falling of the jumper weight and counter weight have to be reckoned with in low-load tests which have a torque speed of less than 30; but in any meter of greater power the periodic changes would be masked more or less by the irregular variations which are inherent in the friction of every kind of train. However, the reporter says that the pointer dial is still unapproached for simplicity. The one trouble is the difficulty of reading it correctly, especially at times when a pointer stands (perhaps more than one pointer) between 9 and 0. Counters were introduced to get over the difficulty; but so long as a counter is allowed to creep at the same rate as the creeping consumption of electric energy, the ambiguity is there. It is strange that buyers have not long since insisted on the jumping device.

Cooker Economy.

There is good reason for a very close study to be made of the economical operation of electric-ovens; for, when we get the overall costs associated with them, it is found that electrical operation is anything but advantageous for the householder, in comparison with the gas-cooker for an equal amount of work. The gas-stove is such a handy and promptly responsive servant that in many households mistress and servants use it for all sorts of things that the electrical man does not count as coming under the term "cooking." But nevertheless he sets electrical operation against the hundred-and-one things for which in the middle class and workman's household the gas-oven is used. Boiling of water even for the children's bath, and other washing purposes, heating of irons, and all sorts of miscellaneous uses fall to the lot of the hard-worked gas-cooker. But it is not so with the electric-cooker, with its lower range of useful service. Nevertheless, there is a perpetual struggle on the part of those concerned with the development of electric cooking to impress the importance of using every means for securing economy. The oven door must not be opened, on account of the flight of the expensively generated heat; the sides and door must be heavily lagged; there must be the minimum of ventilation; thermometers must be used; and signal lights must be employed to indicate whether the current is on or off. The electric-oven also labours under the disadvantage that, when it settles down to work, the level of temperatures is limited to the number of switches employed—full heat, three-quarter heat, half heat, and quarter heat. Mr. P. W. Gumaer has been reading a paper before the American Institute of Electrical Engineers on the economical operation of electric-ovens; but, although (say) 75 per cent. of the work is done on the wasteful hot-plate, he has almost completely confined himself to the economy to be derived from the oven. We do not see that he advances anything particularly new. Energy losses are due to radiation and convection, opening of oven doors, &c. He also finds, or thinks he does, that the high preheating of the oven for the coagulation of the exteriors of joints is a cause of waste, and suggests instead searing in a tin on the hot-plate before putting the meat in the oven at the ordinary cooking temperature. He has also come to the conclusion that for oven work there is a certain comparatively low temperature which is most economical. The "Electrician" is evidently getting somewhat wearied of this persistent plea for the application of greater refinements to help electric cooking to raise itself to better economical status; for it says: "We may rest assured that the cook will not depart from present methods more than she can help; and therefore in investigating such matters, it should be borne in mind that refinements must not be carried too far."

Thermal Insulation Tests.

At the Harvard University, an investigation has been made into the resistance to heat offered by five different kinds of oven wall, the oven in question being one used for electrical work at the University, rectangular in shape, with walls composed of asbestos board. The results will probably interest gas-oven makers on this side. The oven measured externally 63 in. by 41½ in. by 44 in., and internally, 56 in. by 34½ in. by 35 in. (approximately). It was found that after seven or eight hours from the commencement of heating—mark the seven or eight hours!—the rate of rise of internal temperature was sufficiently small to enable heat input to be taken as heat leakage without serious error. The ovens provided with double walls, containing a simple air-space between them, showed about 60 per cent. more thermal resistance to the escape of heat than a single wall, after a steady input for from seven to eight hours. Inserting a few horizontal wooden strips into the walls to break up the air space into compartments had no appreciable effect. Packing the hollow walls with loose dry cotton waste increased the double-wall thermal resistance nearly 50 per cent., and packing with a loose flocculent mineral substance nearly 90 per cent. The latter substance is procured in Indiana, and is fused and blown out with compressed air.

COAL MINING AND THE WAR.

Departmental Committee's Report.

THERE was issued last week, as a White Paper, the report of the Departmental Committee appointed to inquire into the conditions prevailing in the coal-mining industry, with a view to promoting such organization of work and such co-operation between employers and workmen as, having regard to the large numbers of miners who are enlisting for naval and military service, will secure the necessary production of coal during the war. There were seven members of the Committee, of which Sir Richard Redmayne, K.C.B., Chief Inspector of Mines, was Chairman. There were thirteen meetings in public, at which 27 witnesses were examined; and several weeks were occupied in obtaining accurate statistics [which are included in the report] as to the extent of the shortage of labour and decrease in output. The first part of the report is occupied with pointing out the situation which had to be met—a net deficiency of labour and in output, at the end of February, to the extent of 13½ per cent. Consideration is then given to means for meeting the situation—*i.e.*, possible measures for maintaining or increasing the output of coal. Lastly, the Committee were requested to consider the recommendation of the Departmental Committee appointed to inquire into the retail price of coal, that "exports to neutral countries should be restricted."

The following is the Committee's summary of the conclusions arrived at by them.

The number of persons from coal mines who joined His Majesty's forces up to the end of February, 1915, is 191,170.

We find from returns representing 89 per cent. of the total labour employed in coal mines that the net decrease in mine labour at the end of February amounted to 134,186 persons, or 13½ per cent. of the persons employed in July, 1914, and that there has been, over the seven months August, 1914, to (and inclusive of) February, 1915, as compared with the corresponding months twelve months earlier, an average fall in output of 3,044,329 tons (or a total loss in output of 13½ per cent.), which loss will continue unless means are taken to prevent it.

We find also that absence from work over all classes of mine workers, on the days on which the mines were open to work, was, for the seven months preceding the war, an average of 10·7 per cent., and for the seven months succeeding the outbreak of war an average of 9·8 per cent.; and we have arrived at the conclusion that fully 4·8 per cent. of this is avoidable absence. The absenteeism, taking the coal getters only, is very much higher. Were there no avoidable absenteeism, the output would be increased to the extent of between 13 and 14 million tons; but perfection in this respect is not to be expected. We believe, however, that the case has only to be put before the miners in order to secure a great response on their part; and we suggest that the body best fitted in all respects to put forward the case is the Executive of the Miners' Federation of Great Britain.

We suggest, also, that the question of the curtailment of holidays and "stop-days" during the war might receive the attention of the same body.

The loss in production for the year commencing from the outbreak of war will, unless means are taken to reduce the loss, probably amount to 36 million tons, against which must be put a probable reduction in the quantity of coal exported of 24 million tons, leaving a net shortage of 12 million tons. But if the miners continue to be recruited for the Forces, the deficiency will be increased.

The evidence before us is conclusive that if labour is further

withdrawn from the collieries (notwithstanding the adoption of all possible ameliorative measures), the output will be so reduced as to seriously affect the industrial position of the country; and the time appears to the Committee to have arrived when very full consideration should be given to the question as to whether further recruiting among the miners should be encouraged.

With reference to the Eight Hours Act, we suggest that the owners and workmen should confer together and determine to what extent, if at all, the Act should be suspended in individual districts—*i.e.*, to what class of labour the suspension should apply, and the amount in point of time the suspension should cover.

We do not advise that women should be employed to a greater extent than at present on the surface of mines.

We do not suggest that the age limit at which boys can be employed below ground or on the surface should be reduced.

If the restriction of the export of coal to neutral countries is found advisable, we have pointed out that special consideration should be given to those mining districts which to a large extent depend on export for the existence of the collieries.

We think that the importance of economy in the use of coal should be brought before the public. Savings which at once occur to the mind are economies in public and private lighting, whether by gas or electricity, and the manufacture of luxuries which require coal. The rise in the price of coal will no doubt create a tendency towards economy; but we believe that a considerable further saving could be effected if it were brought home to the public that it is a patriotic duty to economize coal during the period of the war.

The basis of all the proposals and suggestions made by the Committee is harmonious co-operation between employers and employed through the medium of the organizations on both sides thoroughly representative of the parties. Unless the organizations possess this power, and are able to act with authority for both owners and workmen, friction may arise and stoppages of work take place which ought to be avoided at the present time to the utmost extent possible.

In the highest interests of the nation, it is especially desirable that during the period of the war the employers should co-operate with the representatives of the workmen on such questions as non-unionism, or other questions likely to lead to any friction or stoppage during the present unprecedented circumstances.

COAL SUPPLY OF GERMAN GAS-WORKS.

A PAPER on the coal supply of German gas-works was read by Herr A. Frank, of Charlottenburg, at the sixth ordinary general meeting of the German Illuminating Engineering Society, which was held on Jan. 30 last at the Imperial Physical-Technical Institute at Charlottenburg, under the chairmanship of Herr Warburg. The following is a summary of the contents of the paper, which is specially interesting in view of the difficulties with which German gas-works are now faced owing to the state of war.

The German gas industry produced 3169 million cubic metres (111,915 million cubic feet) in the year 1913, which is equivalent to a consumption of about 10,563,000 metric tons of coal. The utilization of this large quantity of coal in the manufacture of gas, with the consequent production of ammonia and tar as bye-products of great value in agriculture and industry, is a matter of such importance that any restriction of the work of gas-works is highly undesirable. The coal carbonized on German gas-works represented about 5·5 per cent. of the output (191,511,000 metric tons) of bituminous coal of the German coal mines in 1913. On the other hand, during the same year, coal, coke, and briquettes corresponding to 45,800,000 metric tons of bituminous coal were exported from Germany. The imports of bituminous coal (chiefly English) into Germany amounted to 10,500,000 metric tons. The imported English coal serves chiefly for the supply of the districts of North Germany, to which the freight by sea from England is less than the freight from the Upper Silesian and Westphalian coalfields. For instance, in 1913. the Charlottenburg Corporation Gas-Works carbonized 193,800 metric tons of coal, of which 74·4 per cent. was English, the price being from 2s. to 6s. per ton less than the price for Upper Silesian and Westphalian coal delivered on the gas-works. Again, the Corporation Gas-Works of Berlin carbonized 917,000 metric tons of coal in the year, of which 73·2 per cent. was English. While the supply of English coal has relieved these two cities of considerable extra expense in past years, they are now faced with the impossibility of obtaining supplies of English coal; and the German collieries are not only asking higher prices for supplies during the continuance of the war, but are endeavouring to make these supplies conditional on contracts being made for several years at prices which will throw a great burden on the town finances for a considerable time after the close of the war. Further, it ought not to be forgotten that German coal, as supplied since the war started, has contained a much higher proportion of ash than ordinarily.

On the other hand, the German collieries are now sacrificing a good deal through keeping the coke-ovens working in war time, with the object of recovering the bye-products—viz., ammonia and benzol with its homologues (toluene, &c.). It should be remembered, however, that carbonization on gas-works gives at least as high a yield of ammonia as in coke-ovens, and the yield of tar is in both cases about 5 per cent. The recovery of benzol, which is a matter of such importance for munitions of war, is, however, more efficient on coke-ovens than on gas-works, because the benzol cannot be washed out of gas, which is required to retain its full illuminating and calorific value. The yield of benzol and homologues from the West German coke-ovens in 1912 was 72,000 metric tons, and 95,000 metric tons in 1913, whereas the tar—amounting to about half-a-million metric tons—produced on gas-works, yielded only a comparatively small quantity of benzol. While, therefore, coke-ovens are in an advantageous position in this respect in regard to present conditions, gas-works, on the other hand, have to meet the requirements to an increasing extent, owing to the high price of petroleum, of larger numbers of the less well-to-do sections of the population. Notwithstanding the increased price of coal, they are consequently precluded from increasing the price of gas to a corresponding degree.

Thus gas consumers have the advantage, both in its use for lighting and heating purposes, since 1000 cubic feet of gas in practice are at least equivalent to 63 lbs. of coal for heating. External heat, from the consumption of gas, helps to maintain the body temperature, and thus admits of an economy being effected in the food consumption for the production of heat internally, which is a matter of considerable importance in regard to economy of food in war time. Reference may also be made to the fact that coke has nearly double the volume of the same weight of coal. Hence, at the present time, when the railways are so nearly monopolized for military purposes, the transport of coke from ovens is less economical than the transport of coal to gas-works.

At the conclusion of Herr Frank's paper, Herr Eitner observed that the difficulty which the gas-works of South Germany had experienced in obtaining coal was primarily due to the scarcity of transport workers.

IMPERIAL GAS ASSOCIATION OF JAPAN.

THE third annual ordinary general meeting of this Association was held on April 11 at Tokyo. From a brief notice of the proceedings contained in the European section of the "Journal of the Imperial Gas Association," we learn that there were about ninety members present, representing various gas companies and others connected with the gas industry. This was regarded, says our contemporary, as a comparatively large attendance, notwithstanding some national function held the same day, and "bore witness to the excellent relations existing among those interested in these circles of industry."

At the opening of the proceedings, the President (Dr. T. Takamatsu) delivered an address, in the course of which, after alluding to the constitution of the Association, he dwelt upon some of the special efforts of the Committee during the past year—among other things, the compilation of a volume of gas statistics asked for by the Department of Agriculture and Commerce, as also a proposal for promoting a gas bye-products recovery industry.

After the financial statement had been presented by the Manager, Mr. Y. Fujiyama, Dr. S. Hiramatsu gave some particulars as to the various sections of the Association's activities during the past year, embracing (1) correspondence teaching, (2) opening of night schools, (3) compilation of gas text-books. He bespoke the assistance of the members in making all these sections of the Association's work a real source of use to the members.

It was announced that the Committee appointed to settle a system on which statistics of the gas industry of Japan should be prepared had now finished their work, and it was expected that the first compilation would be in the hands of the members within a few days.

Mr. M. Mizuta reported that the Committee of which he had charge, dealing with the subject of the establishment of a calorific standard for testing the gas supply, had met twice during the past year, and eventually decided to adopt the "gross," instead of the "net," calorific value as previously determined upon. The provisions on this subject will, therefore, be: (1) The calorific standard of gas to be 520 B.Th.U. gross; (2) a gas possessing a calorific power of 470 B.Th.U. gross may be supplied; but it must not be less than 520 B.Th.U. standard as an average for any three consecutive days; (3) it is provided that in any case it is unsuitable to supply gas with a calorific power of less than 450 B.Th.U. gross.

The formal proceedings concluded with some speeches dealing with the future of the gas industry in Japan, and advocating the seeking of extended markets for gas as well as bye-products.

A banquet followed, and subsequently the members visited a gas exhibition that had been promoted by the Association, and which was held in the Asakusa office of the Tokyo Gas Company. It was intended to keep the exhibition open for a week from April 11. There were a considerable number of exhibits of great interest to the members, as also to the general public. It was stated that nearly a thousand visitors were daily attracted to examine the goods on show.

RUSSIA'S COAL GAS INDUSTRY.

At a meeting of the Russian Technical Society on May 13-26, Mr. P. I. Shestakoff lectured on the present position of the gas lighting industry in connection with the movement for emancipating the Russian chemical industry from foreign control. He drew attention to the great extent of the use of lighting gas for lighting, heating, and industrial purposes abroad, and dwelt on the causes of the feeble development of the gas industry and its limited consumption in Russia. He observed that in foreign countries, under the influence of competition between gas and electricity, unprecedented progress had taken place in the use of the "waste" products, the cheapening of production, and the attainment of a high degree of lighting efficiency. The cheapness of gas compared with electricity, with the convenience it offers of power, light, and heat in one agent, has made it victorious over electricity abroad, where complete establishments use lighting gas for power, lighting, and heating wherever required.

The consumption of gas in England, he said, was 6000 million cubic metres a year; in Germany, 2500 million cubic metres. But in Russia it was only 120 million cubic metres. The relative consumption of gas in the towns he gave as 800 million c.m. in London; 480 million c.m. in Paris; 350 million c.m. in Berlin; 150 million c.m. in Vienna; 53 million c.m. in Warsaw; 19 million c.m. in Petrograd; and 15 million c.m. in Moscow. So that, notwithstanding the clearly-established superiority in cheapness and convenience of gas, the production and consumption of this source of light, heat, and power in Russia remain in primitive proportions. But the production of gas, besides its direct advantages, is a great source of other products. After quoting the enormous figures representing the bye-products of various countries, he found that in Russia only 120 million cubic metres of gas, value 10,000,000 roubles a year, are produced; coke figures at 12 million poods, of a value of 2,500,000 roubles; tar at 1,850,000 poods, value 600,000 roubles; ammonia, &c., at 200,000 roubles. Such a limited production is very prejudicial to the chemical and pharmaceutical industries, the progress of which in Germany is largely due to the abundance and cheapness of gas tar obtained as a bye-product of gas production.

In conclusion, the lecturer referred to the brilliant financial results obtained by the only efficiently equipped gas-factory in Russia—that of Warsaw, which in the year 1913, with a nominal capital of 9,000,000 roubles, made a profit of 1,300,000 roubles, thanks to its efficient and systematic management—including certain reductions to consumers, active propaganda, &c., all which "presents a strong contrast to the listless, dragging, pitiable aspect of the Petrograd Gas-Works."

MODERN PYROMETRY.

At the Newcastle Gas-Furnace Exhibition [which was noticed in last week's "Journal," p. 579] on the 7th inst., Mr. Robert S. Whipple, of Cambridge, delivered a lecture on "Modern Pyrometry"—Mr. Charles J. Potter, the Chairman of the Walker and Wallsend Gas Company, presiding over a large audience.

Mr. Whipple said that no excuse was needed for urging the importance of pyrometry at the present time. In the manufacture of armour plate, shells, and cartridges, pyrometric control was of the greatest importance. By means of a diagram he showed the methods in general use for the measurement of temperature. Considering the first or the expansion group of pyrometers, he stated that though the gas-thermometer was the most important instrument in this group from the scientific point of view, yet commercially the only ones of importance were the mercury ones, in which the mercury was contained in either a glass or steel envelope. He referred briefly to the work of Dr. Day and Mr. Sosman, in which, by surrounding the bulb of the gas-thermometer by a gas also under high pressure, they had been able to extend measurements with the gas-thermometer up to 1500° C.

The pyrometer in most general use at the present time was the thermo-electric couple. Le Chatelier, the French physicist, has shown that a thermo-couple, one element of which was pure platinum and the other platinum 10 per cent. rhodium, was remarkably constant in its readings, assuming that it is protected from the deleterious effects of various gases. Unfortunately, platinum and its alloys are extremely expensive at the present time; and for this reason a great deal of work has been devoted to the study of thermo-couples made of cheaper materials—these elements being generally referred to as "base metal" thermo-couples. A diagram was shown illustrating the electro-motive forces given by various couples.

In discussing these thermo-couples, Mr. Whipple gave some figures to show that if the iron constantan thermo-couple were suitably protected, it gave reliable results up to 1000° C. over long periods of time.

The lecturer pointed out that accurate measurements could only be obtained with a thermo-couple if the precaution were taken to maintain the "cold junction" at a constant temperature. In a works it is not at all easy to do this. Various methods have been adopted—such as water cooling the head of the pyrometer; but this is clumsy and not very practicable. The best method is the employment of Peake's compensating leads. These leads consist of two wires, one of which is copper and the other an alloy of copper with nickel—these giving the same electro-motive force one against the other as the platinum rhodium thermo-couple. If the wires be suitably connected to the platinum couple, the "cold junction" is transferred from the head of the pyrometer to the end of the compensating leads. This junction may then be kept at a constant temperature by insertion in a thermos flask filled with oil, or by burying in the ground.

Two methods were in general use for measuring the electro-motive forces generated by a thermo-couple; one a direct deflection method, and the other the balancing of the electro-motive force by a counter electro-motive force. The majority of instruments in use in this country were purely deflection ones, though, where absolute accuracy is required, the balancing or potentiometric method must be employed. With the latter method it is possible to obtain an open scale, even on instruments used commercially in a works. A record was shown in which such a scale had been employed, the difference between the record obtained on the usual scale 0° to 1000° C. and that on the more open scale, 700° to 950° C., being very striking. A somewhat similar method has been adopted by Dr. Rosenhain in the Rosenhain and Melsom potentiometer. This is a simple potentiometer adapted for works use, and quite complete in itself as a standardizing unit. Works potentiometers of this kind have recently been developed in the United States. The potentiometric method undoubtedly eliminates troubles due to changes in the resistance of the leads of the thermometer, and at the same time a much more open temperature scale can be obtained.

A short summary was given of the resistance thermometers in general use; and it was pointed out that for temperatures up to 1000° C. the platinum-resistance thermometer had been practically adopted as a subsidiary standard. The resistance method of measuring temperature has several practical advantages over other methods: (1) It is capable of high accuracy over the range 0° to 1000° C.; (2) no errors are introduced by the heating of the thermometer head; (3) the readings of thermometers are independent of the distance from the galvanometer or recorder to which they are connected; and (4) they may be made to indicate or record on a very open scale. Such thermometers have been employed to measure the temperature of powder magazines, the temperature being indicated at a distance of many hundreds of yards from the magazines.

A *résumé* was next given of the more recent developments in radiation and optical pyrometers. In the case of the Féry pyrometer, the radiation received from the furnace is concentrated by means of a mirror on to a small thermo-couple connected to a galvanometer; the outfit being calibrated so that the readings given on the galvanometer correspond to degrees of temperature. A modification of this pyrometer was introduced a few years ago by Professor Féry, in which he substituted a bimetallic spiral for the thermo-electric couple. This spiral carries on it an aluminium pointer which is moved over a dial by the expansion or contraction of the spiral. This pyrometer has been very generally used for the measurement of the temperature in gas-retorts. A short description was also given of the Holborn-Kurlbaum, Wanner, and Thwing pyrometers.

Mr. Whipple stated that he believed sufficient thought was not given to the method of placing pyrometers in furnaces. His experience showed that the majority of pyrometers were broken mechanically and not through over-heating. If it is possible a pyrometer should be inserted into the muffle or furnace in such a way that it could be left there permanently, and also that it cannot be knocked when work is moved in or out of the furnace. In the case of large furnaces, the method due to Mr. Culpan was recommended. In this method a groove is chipped in the floor of the furnace into which a fire-clay tube is grouted, the pyrometer being inserted into this tube. Illustrations of various methods of mounting pyrometers in furnaces were shown. In the majority of operations the actual temperature at which the work is heated is not required. It is only necessary to repeat a temperature which has been found by experience to give satisfactory results.

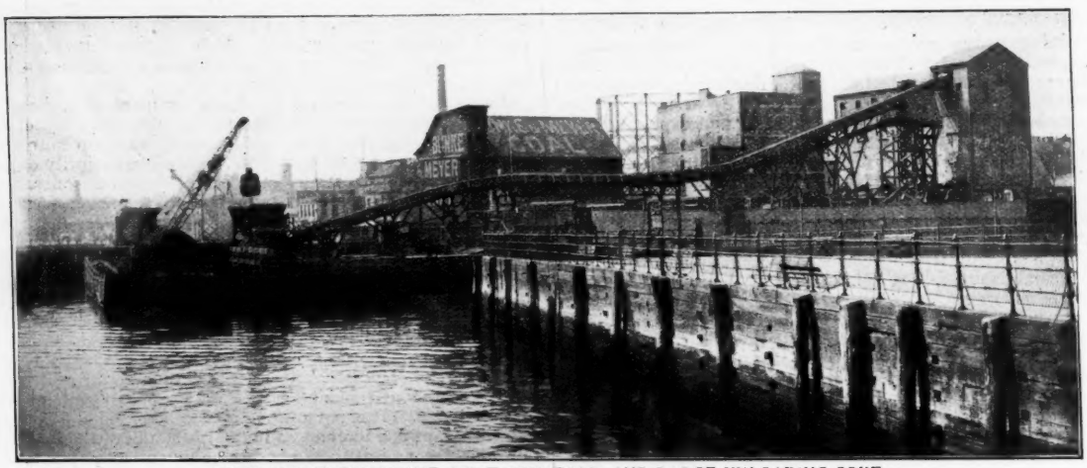
A selection of interesting records obtained in works practice was shown. The importance of placing the recorder near the man who has control of the furnace cannot be too strongly emphasized. If the men are persuaded that the instruments are installed as friends to help them turn out better work, rather than as policemen to see whether they fail in their duties, the management will find that the men will do everything in their power to make the instruments a success. Some records recently obtained by Professor Coker of the temperature cycle in a gas-engein cylinder were exhibited. The records were obtained by photographing the movements of the string in a string galvanometer; the string being connected to a fine thermo-couple inserted in the cylinder of the gas-engine. The instantaneous rise in temperature with the explosion was clearly shown.

In conclusion, Mr. Whipple stated that, although pyrometry was one of the youngest of the sciences, he hoped that he had been able to show that it was one of considerable service in industry.

The Chairman moved a vote of thanks to the lecturer, and Dr. I. J. Dunn seconded it.

When replying to the vote of thanks, Mr. Whipple mentioned that the great want of the pyrometer manufacturer at the present time was a suitable material for protecting pyrometers when immersed in molten metals at a high temperature.

THE COKE-HANDLING PLANT OF THE NEW YORK CONSOLIDATED GAS COMPANY.



COKE-SCREENING PLANT, BELT CONVEYOR, AND BARGE UNLOADING COKE.

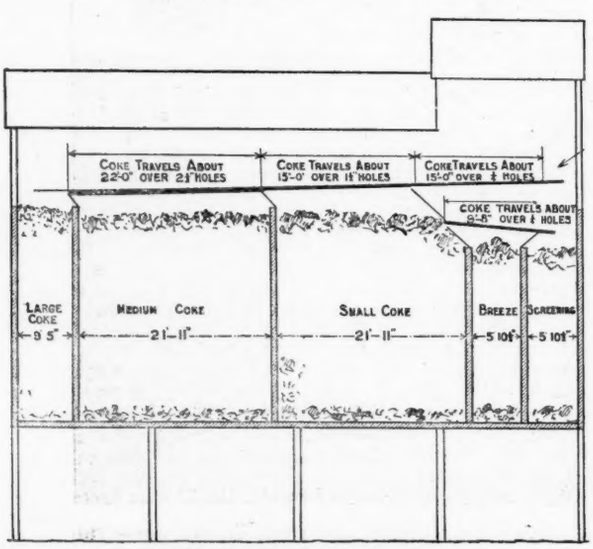
The Barge with the Unloading Apparatus at the Dock Delivering Coke on to a Belt Conveyor from the Dock to the Coke-Screening Plant.

In the "Journal" for Feb. 23 some extracts were given from the annual report (for 1914) of the Consolidated Gas Company of New York. In the course of it, it was stated that last October a new coke screening and sizing plant, equipped with devices for the rapid loading of trucks and for measuring and bagging coke for the retail trade (having a capacity of 1000 chaldrons) was put into operation. Though it had been running only a short time, it had already demonstrated its superiority over any method of handling coke. Again, during the year there was constructed a new barge for transporting coke from the Astoria plant, and unloading it at the several delivery points in New York City. The boat was of a new design, and equipped with rapid unloading mechanism of an improved pattern. It was put in operation in the latter part of October, and a material decrease in coke breakage had resulted.

Mr. George B. Cortelyou, the President of the Company, has been good enough to respond to a request for further particulars of the plant—accompanying a brief description with a sketch of the coke-sizing arrangement, and a large number of excellent photographs of the installation, some of which are reproduced herewith.

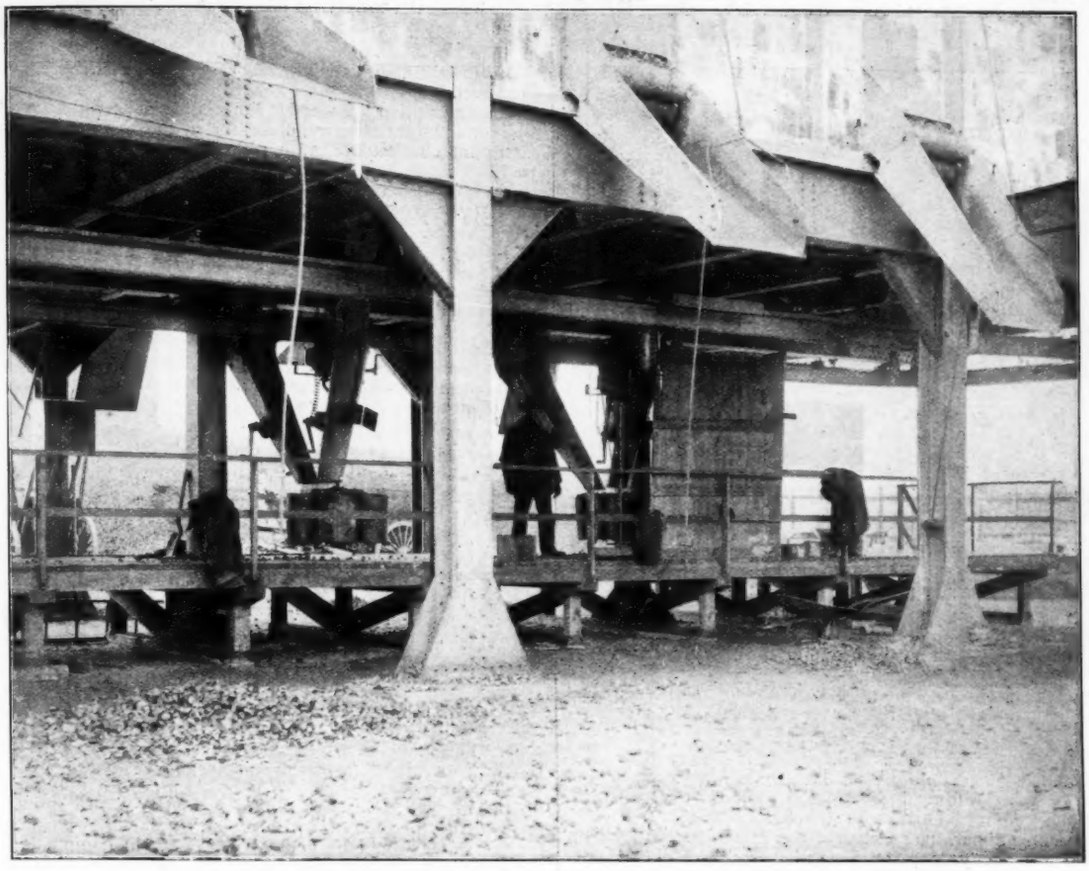
He points out that the coke screening, storing, and bagging plant, as recently built by the Company, is located on property between 110th and 111th Streets and First Avenue, Borough of Manhattan, New York City. It was erected in the latter part of last year, and was put into operation early this year.

The plant consists of a steel-frame structure, with hollow tile

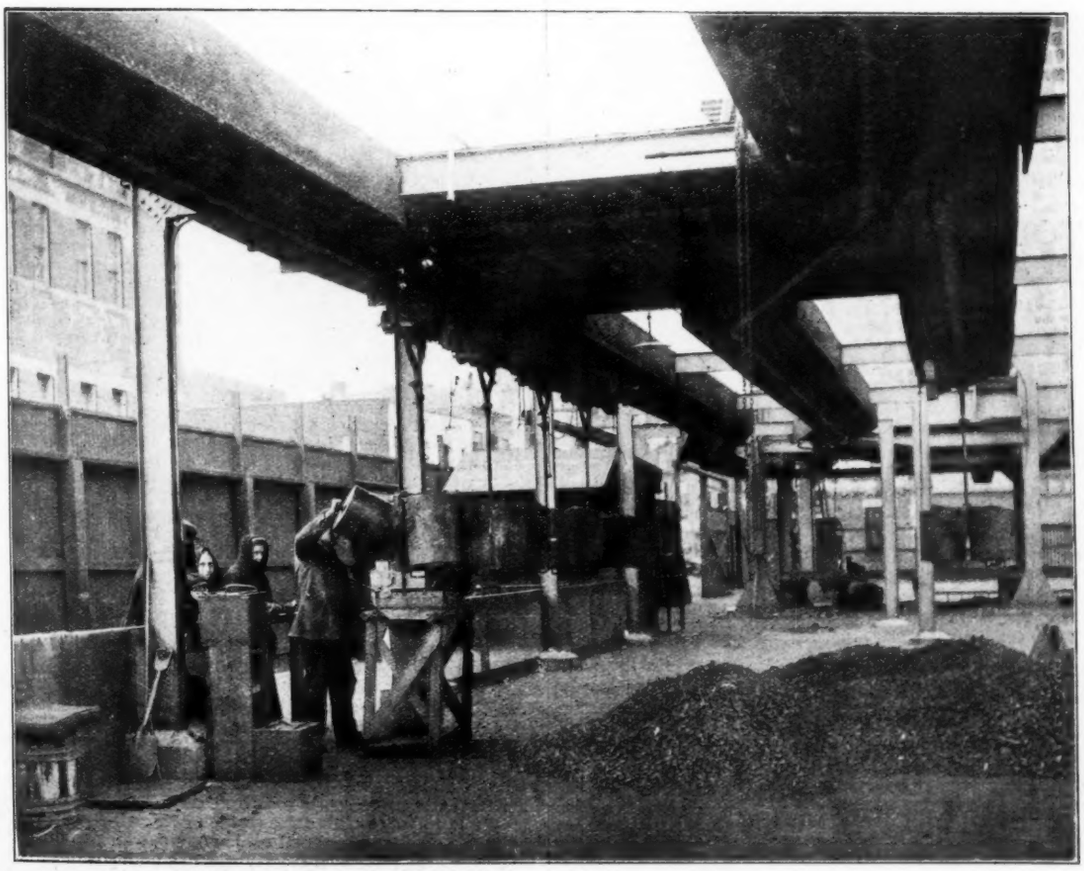


Section of the Coke-Screening Plant.

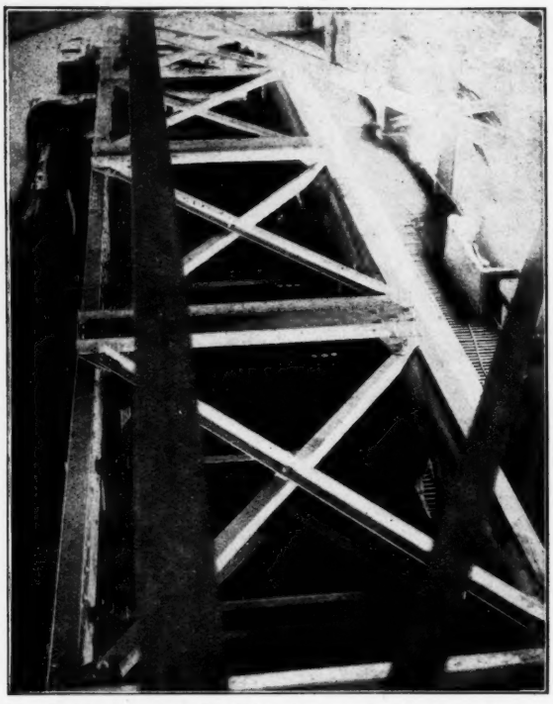
Arrangement of Shoots at One Side of the Structure.



THE SHOOTS UNDER THE STRUCTURE, FROM WHICH THE TROLLEY BUCKETS ARE FILLED.



A GENERAL VIEW OF THE ELECTRIC TROLLEY SYSTEM, WHICH CONVEYS THE BUCKETS FROM THE SHOOTS UNDER THE STRUCTURE TO THE YARD IN WHICH THE BAGGING IS DONE AND THE BAGGED COKE IS SOLD.



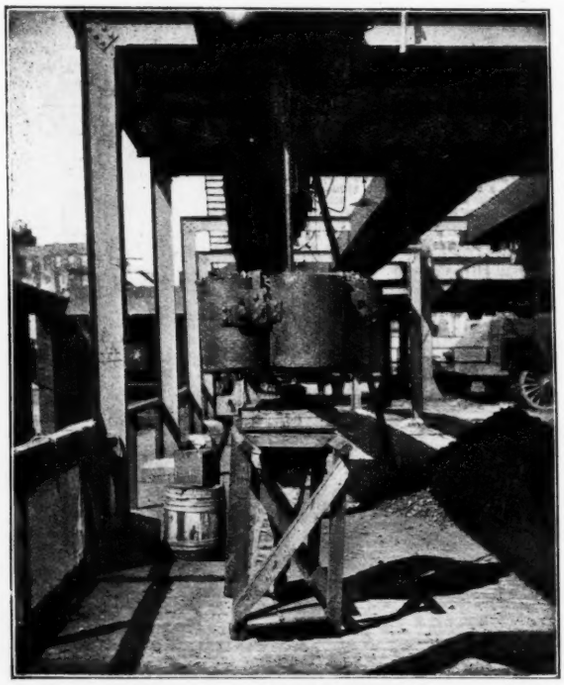
View Looking Down on the Sizing Screen—Showing the Perforations in the Steel Plates for Sizing.

enclosing walls and partitions. The operating gallery at the top of the structure is made up of steel-slat grating; while the enclosure above the operating floor and the roof are covered with No. 20 gauge corrugated asbestos protected metal.

The screening apparatus consists of two sets of screens, which have each a capacity of 40 tons of coke per hour. The sizing screens are perforated with holes, varying in diameter from $\frac{7}{16}$ inch to 2½ inches, which separate the coke into five sizes. These screens are of the oscillating jigging type, and are operated by motor-driven gears and shafts.

Shoots are provided at either side of the structure for the delivery of coke to carts. There are also provided, immediately under each pocket, shoots controlled by measuring cylinders calibrated to deliver exactly one bushel. From these shoots delivery is made to the trolley buckets (also having a capacity of one bushel each), which, after being filled, are conveyed by an electric trolley to the bagging point, where the bags are filled in the presence of the purchaser.

The coke barge referred to is 115 feet long and 33 feet beam, having a carrying capacity of 800 chaldrons of coke. The unloading apparatus of this barge consists of a 15-ton locomotive crane operating a grab bucket. The bucket is a 100 cubic feet Brown bucket. The apparatus has a capacity of 80 chaldrons of coke per hour. The boom of the crane is 40 ft. 9½ in. long, and is provided with an extra member so that it can be lengthened to 57 feet.



Another View of the Bucket Conveyors.

The descriptive lines under the photographs will give all the additional information requisite for a due appreciation of the extent and convenience of the arrangement.

BYE-PRODUCTS FROM PRODUCER GAS.

An article that recently appeared in the German publication "Gluckauf"—according to the "Chemical Trade Journal"—dealt with a water-jacketed gas-producer with bye-product recovery plant. It pointed out that the main idea of the process consists in preventing the decomposition of the ammonia formed in the producer without the introduction of excessive quantities of steam.

For this purpose, the ammonia formed is protected against decomposition only by the outer cooling of the producer above the combustion zone; while the steam required for the formation of the ammonia is introduced under the combustion zone only in such quantity as is necessary for the formation of the ammonia. There are three zones in the producer. The first and uppermost zone is cooled on the outside by air, and has a temperature which is lower than that in the usual producers—in the mean about 180° C.; the second zone, which is cooled by the water jacket, has a mean temperature of 300° to 450° C.; while in the third and lowest zone a temperature of 800° to 1000° C. prevails. As soon as the temperature of 450° to 500° C. is reached, any further protection of the ammonia by steam is saved.

The cooling of the gas is effected in a series of tabular coolers, with which the outer air comes into contact, after which it is freed from the tar in a tar-separator of the Pelouze-Audouin type. The ammonia is not separated by means of sulphuric acid, but in two scrubbers placed one behind the other, whence it issues as ammonia liquor. With the old process a similar method of working would not pay, as owing to the large quantities of steam to be thrown down with the ammonia, large quantities of cooling water would be necessary. These, in conjunction with the water to be separated, would cause the ammonia liquor to be too dilute for easy working.

It is said to be possible to operate a gas-producer of this design with a capacity of about 300 H.P. and upwards with profitable results through the recovery of the bye-products.

Gas Employees and Enlistment.

The Engineer and General Manager of one of the London Suburban Gas Companies writes to point out that the discussion on this subject at the recent Institution meeting is most confusing to those in control of gas-works. He sends a copy (as follows) of a letter he wrote to the War Office on the 21st ult.

> The Chief Recruiting Officer, War Office, S.W.
>
> Dear Sir,—A large percentage of our men have joined H.M. forces, we having encouraged it by promising them to keep their positions open for them and by supporting their dependants while they are away. The time has now arrived when our work is being carried on at the greatest possible inconvenience, owing to our difficulty in obtaining men able to perform the necessary work. Will you be good enough to inform me if in the case of public service companies, such as this is, officials and employees are exempt from service, and would they also be exempt if compulsory service were adopted?—I am, &c.

To the above communication, our correspondent last Wednesday received the following reply.

> Sir,—In reply to yours of the 21st of May, I am directed to inform you that no special steps have been taken by the department to exempt the officials and employees of your company from military service. I am to point out that enlistment in His Majesty's forces is a voluntary act.—I am, &c.
>
> (Signed) R. J. Strachey, Colonel,
> for Director of Recruiting.

Irish Association Meeting Abandoned for this Year.—Mr. George Airth, of Dundalk, writes to say that the majority of the members of the Irish Association of Gas Managers have decided against holding a meeting this year.

Coal Scarcity for Russian Gas-Works.—The "Novoie Vremya" says that the Petrograd Gas-Works is experimenting with wood gas for illuminating the town; for there is a talk of putting wood in the place of coal, owing to the scarcity of the latter. Wood gas is heavier than coal gas, in consequence of which all the burners in the town lamps will have to be changed. This year the lighting of the town was ordered to cease for the summer months (May 1/14 to July 15/28) during which period the town will accumulate a sufficient reserve of coal. Again, owing to difficulties in precuring coal, the Reval Gas-Works has notified consumers that the gas lighting in the streets must be stopped, and advises them to adopt some other system of illumination.

THE BROWETT-LINDLEY GAS-ENGINE.

WHEN describing, in the "JOURNAL" for March 9 last, the gas, water, and electricity works of the Aldershot Gas, Water, and District Lighting Company, reference was made to the four Browett-Lindley multi-cylinder high-speed vertical gas-engines which have been installed—two at the Ash Road Gas-Works, coupled to direct-current dynamos, for supplying power to the stoking machinery and other plant, and two at the electricity generating station at the North Camp works. An illustration of the latter appeared on p. 582; and this, with the particulars then given, we supplement by the following description of the Browett-Lindley gas-engine which has been supplied by the makers.

The gas-engine department of Messrs. Browett, Lindley, and Co., Limited, at Patricroft, Manchester, has been in existence for seven years; and the firm feel that it is undoubtedly due, to some extent, to their long and successful career as builders of high-speed vertical steam-engines, that they have met with marked success with their vertical gas-engines.

Engines ranging in power from 50 to 750 B.H.P. are manufactured; the capacities of individual cylinders varying from 50 to 125 B.H.P. Similar constructional features and methods of operation are adopted for each size of engine; so that a description of the 400 B.H.P. engine will suffice as a general description of each type of engine. The engine is of the single-acting "Otto" cycle type.

The bedplate is constructed on the double-girder principle, and a special long bearing is provided at the flywheel end, while the base and frame are divided on the crank-shaft horizontal centre line, so that the crank-shaft may be lifted vertically and dropped into position, which is an important feature when the space in the engine-room in which the engine is to be installed is limited. The bedplate is bored to receive the main bearings, which are composed of cast-iron shells, lined with white metal, and are designed so that they may be removed after being relieved of the weight of the crank-shaft, lifting off the cap and top half-bearing, and revolving the lower half until it may be lifted freely. The crank-shaft is made of Siemens-Martin open-hearth forged steel, the throws being forged solid and machined all over, while the flywheel end bearing, in addition to being lengthened, as previously mentioned, is of increased diameter. An extension of the crank-shaft carries the gear-wheel for driving the crank-shaft, an eccentric that drives the oil-pumps, and a centrifugal governor of the type usually employed in high-speed vertical steam-engines.

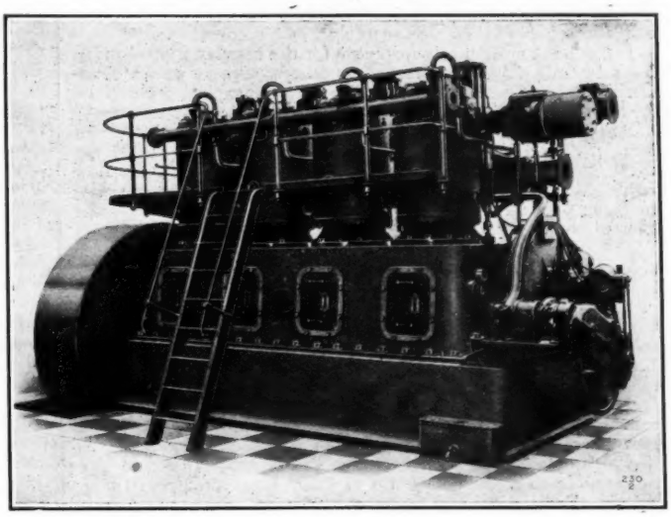
On the bedplate is mounted the frame, which is an extremely stiff casting, completely enclosing the working parts of the engine, and forming the base for the cylinders. It is securely bolted to the bed by a large number of bolts, to ensure that the joint should be perfectly oil-tight when the engine is running; and it is provided with four large inspection doors on each side, through which it is possible to gain free access to the connecting rods and main bearings. On a coupling, forged solid and machined with the crank-shaft, the solid cast-iron flywheel is carried; the latter being carefully balanced and provided with barring gear, and suitably machined for coupling directly to the shaft of the plant that it will be driving.

A special mixture of hard close-grained cast iron is used for the cylinders, which are cast with their water-jackets, and fitted, for the purpose of relieving the casting and temperature strains, with loose joint-rings at the lower end of the jackets; while several doors are fitted, giving access to every part of the water-space for cleaning. There are no valves or other gear attached to the cylinder heads, which may, therefore, be removed by unscrewing the nuts of the cylinder studs and water-jacket connection. This is a great feature, as the pistons and the connecting-rods may be readily withdrawn vertically without interfering with the valve gear or any other mechanism. The cylinder cover is fitted with a removable top, so that the water space may be conveniently cleaned.

A mixture of cast iron similar to that used for the cylinders is used for the pistons; great care being taken to relieve them of casting strains, by annealing after being rough turned. They are finished by grinding. Six piston-rings in all are fitted above the gudgeon-pin, and two rings are carried below. Siemens-Martin mild-steel forgings are used for the connecting-rods; both large and small ends being machined from the solid forging, split, and then fitted with bolts so that the bushes may be adjusted for wear—the bolts being made of best Yorkshire iron. Gun-metal bushes are fitted to both ends of the connecting-rods; those in the large ends being lined with white metal. The crank-shaft, which is carried in bearings fitted in housings in the inside of the engine-frame, is fitted with case-hardened steel cams, which are finished by grinding, forced and keyed into position on the shaft. Cam-rollers carried in long piston-type guides of large diameter, which slide in renewable bushes carried in the upper face of the frame-casting, engage with the cams, lengthy life of the guides being thus assured; while another feature of this construction is that the adjustment of the guides is performed from the outside of the frame casting. The inlet valves are made of steel, and carried immediately above the exhaust-valves in casings that are readily detachable from the cylinder casting.

A special method is adopted for the manufacture of the exhaust-valves, which are made of cast iron with a mild steel core which extends throughout the full length of the valve stem and protrudes at the lower end, this protruding portion being screwed to receive a hardened steel cap. Since this method has been adopted, broken exhaust-valves have been unknown. It will be quite evident that a considerable amount of care has been taken in the design of the valve-gear, special attention being devoted to the provision of long guides for the valve-spindles, and in making the whole gear easily and quickly detachable without disturbing the setting of the adjustments; and, further, the valve-boxes and areas are made of ample size, allowing a reduced speed of gases through the ports, resulting in a high volumetric efficiency as regards the ingoing charge, and reduction of liability of burning and pitting of the exhaust-valves and seats.

Extreme simplicity marks the operation of the governing arrangements; the gas being under the control of a valve operated by the governor. The gas and air are admitted separately, and conducted to the inlet valve casings, not actually mixing until they are admitted into the combustion space of the cylinder. This is accomplished by providing the inlet-valves with spring-controlled gas-valves, which open slightly after air is admitted to the cylinders and close somewhat earlier than the air-inlet valves—thus ensuring that nothing but air is in contact with the inlet-valves when they are closed, and so eliminating any danger of back-firing. All the pins and rollers used in connection with the governor and valve gear are of steel case-hardened and finished by grinding, and are efficiently lubricated. Both battery and magneto ignition are provided; the magneto being of the Bosch high-tension type. The current is supplied to two plugs in each cylinder. The cooling water in the engine illustrated is supplied from a pump driven by the crank-shaft, and after completing its circuit is discharged visibly into the funnel-shaped openings in the drain-pipe.



Two valveless pumps in the bedplate supply lubricating oil to all the working parts, the oil being carefully strained before re-entering the pumps; while it is impossible to remove these strainers without automatically cutting off the supply of oil. Starting is performed by admitting compressed air at about 250 lbs. per square inch to the two middle cylinders—the air supply being provided from an independent source.

SOME TEST RESULTS.

The engine illustrated in the photograph was recently tested in Messrs. Browett, Lindley's shops, coupled with a 250 K.W. three-phase alternator which it is intended to drive. With a full load of 250 K.W., the I.H.P. totalled 451·8; and from the efficiency of the generators the B.H.P. was calculated to be 364·3. These figures show a mechanical efficiency of 80·7 per cent., and a combined efficiency of the whole plant of 74·2 per cent.

At full load, the speed was 250 R.P.M.; and on the load being removed the speed immediately rose to 265 R.P.M., settling in ten revolutions to 262 R.P.M. When the full load was again applied, the speed dropped to 250 R.P.M. and remained stationary at that point. The full load-test was continued for eight hours, when the load was increased to 276 K.W., which is equivalent to 402 B.H.P., at which point it was maintained for a further two hours.

The average heat consumption taken from four engines of this

size and type has been found to be 9980 B.Th.U. per B.H.P. hour, the best consumption recorded being 9540 B.Th.U., and the highest 10,260 B.Th.U.—the difference being accounted for chiefly by the fact that the engine giving the best consumption had been running longer on the test bed and had, therefore, become rather more free.

COKING AND BYE-PRODUCTS.

By "Event and Comment."

Benzol Recovery.

Benzol recovery in connection with bye-product coke-oven installations has attracted much attention since the use of benzol for motor purposes has increased in popularity. Several of the motor journals (particularly the "Motor") have by active propaganda work been largely responsible for the development of this outlet for benzol; and they have for a long time carried on a strong campaign in favour of its use, especially pointing out the advantages to this country in case of war if a large supply of home-produced motor spirit was available. In connection with this agitation the Government were approached with a view to obtaining their aid in encouraging the production of benzol for motor purposes; and the promoters hoped to foster the development of the industry by obtaining from the Government a statement that home manufactured motor spirit could be sold duty free. In this—as in many other instances—the attitude of the authorities was distinctly discouraging, and it was decided that no concessions could be made. This necessarily handicapped the efforts of those who were advocating benzol. But, in spite of this, much good resulted; and to-day almost every bye-product coke-oven plant in the country has a benzol recovery plant attached to it—the exceptions being principally Welsh installations at which coal is carbonized containing such a low percentage of volatile matter that the benzol in the gas is scarcely worth recovering.

It has been particularly fortunate for the country that so many benzol plants have been erected, as otherwise there would inevitably have been a great shortage of toluene for explosive purposes. As it is, many of the existing plants are of more or less antiquated design; and with modern plants in place of these the quantity of benzol recovered could be very considerably increased. Even those plants which have not hitherto recovered benzol are now considering the possibility of doing so, and are for this purpose in touch with the High Explosives Committee. Tests are being carried out on many plants to decide the advisability of erecting benzol plants; and the writer has dealt with a few such cases recently. The principal trouble is to get at a really satisfactory test for the purpose, as the majority of tests usually employed are of little value. We are evidently in for a period of high-pressure work in the shell-making line; and all the possible production of toluene will be required. The Government—through the High Explosives Committee—have taken some steps to increase the quantity of toluene, by arranging for its recovery from town gas and also from coke-oven plants, as mentioned above. This is all very well in its way; but it does not go nearly far enough. It means creating new resources as well as erecting new plant, all of which entails both additional time and money. It should also be possible to make better use of existing resources by organization. Every coke-oven manager knows that in order to comply with buyers' specifications for crude benzol—*i.e*, that 65 per cent. shall distil below 120° C.—a fair quantity of toluene has to be run back continually into the scrubbing oil; hence is not recovered. The obvious thing, therefore, is for the Government to compel buyers to modify the specification in order to allow of the recovery of this toluene.

In connection with the purely engineering side of shell-making, the Government have lately been taking engineers into their confidence, and have organized both supplies of materials and of machinery in such a way as to get the best out of them. They have allowed engineering experts to control the methods and processes of manufacture, and so ensure the maximum output. They should do the same with the chemical side of the work, and especially in connection with the production of the raw materials. It is, of course, well understood that certain conditions are necessary in order to produce the maximum quantity of toluene from the distillation of a given class of coal. What these conditions are, only an expert in coke-oven practice can determine; and they are not necessarily harmonious with the best conditions for the other sections of the work. As long as private interests are being considered at all, it is not possible to attain the best results. At the same time, it is hardly fair to expect a private individual to bear any loss involved in working under unfavourable conditions solely for the benefit of the country unless his neighbour and competitor is compelled to do the same. Without Government control, therefore, it is not possible to achieve the best results; and surely matters are serious enough to warrant drastic steps being taken. Nationalization of collieries has been suggested in connection with the difficulties pertaining to coal supplies; and it might well be extended to include all industries engaged in producing munitions of war as long as the war lasts. Apparently the authorities have not much faith in the claims which have been made with regard to low-temperature distillation for the production of benzol, &c.

On War Service.

At the recent meeting of the Institution of Gas Engineers reference was made to what must be regarded as a very important subject—viz., the recruiting of gas workers. It was properly pointed out that those who are engaged in the production of gas are rendering very valuable public service—frequently of such a character that its cessation would be greatly detrimental to the rapid production of munitions. It is very difficult to understand the attitude of the Government to workers of this nature. It is evident to everyone else that the work they are doing is absolutely essential to the domestic and national well-being of the country; yet the thought of official recognition of the fact has apparently not so far entered the head of the official responsible. However small the part played by him may be, the worker in an engineering shop producing war material is recognized as a war worker. But what is the good of the empty shell cases alone? The man who makes T.N.T. from toluene is officially recognized as a war worker. But what of the man who makes the toluene? The Government are doing all in their power to find sufficient men for armament and shell works. Permission to enlist has to be obtained from the employer in most cases before a man can go from an engineering shop engaged on war work. The cry is now also being raised that this shall apply to colliers. Surely it is time that something was done in the case of coke-oven men and others who are engaged in the production of vital necessaries for the carrying on of the war! Men on coke-ovens are every whit as usefully employed as men who are turning shells; and it is time that official recognition of this fact was forthcoming, in order that bye-product coking shall be successfully and efficiently carried on, and not adversely affected by lack of men.

MIDLAND JUNIOR GAS ASSOCIATION.

An interesting and instructive visit took place on Saturday, when about fifty members of the Association, together with the President (Mr. F. J. Ward, of Knowle) visited the head offices and show-rooms of the Birmingham Gas Department, at the Council House, on the invitation of the Gas Committee. The party were received in the main entrance hall by Mr. S. R. Barrett (the Fittings Superintendent), who offered the members a hearty welcome in the absence of Sir Hallewell Rogers (the Chairman of the Gas Committee) and Captain R. S. Hilton (the Secretary and Manager), both of whom were absent from town on urgent war duty. The members were accompanied by Dr. W. B. Davidson (the Engineer to the Nechells works) and Mr. E. W. Smith (Chief Chemist). The party divided into two sections; one being led by Mr. Barrett, the other by Mr. R. J. Rogers (the Assistant Fittings Superintendent).

After duly admiring the spacious entrance hall, which is lighted by 300-candle power Sugg gas-lamps, the members proceeded to the large and well-arranged show-rooms, where the gas-fires and cookers, pendants and shades, radiators, &c., provided interest for all. Mr. G. M. Lewis (the Show-Room Superintendent) was present to afford explanation; and Mr. W. B. Cobb (the Department's Hot-Water Section Expert), who recently read a paper before the Association, was also present. The show-room stores were next visited, where all the various types of lamps, fittings, fires, and cookers are stocked. The department have done much lately in standardizing parts of burners, &c., so as to simplify and facilitate the fitters' work; and one point on these lines to which the members had their attention directed was in reference to glass globes for large inverted burner lamps for shop and outdoor lighting. The same globe was shown fitted to half-a-dozen or more different lamps—the mode of attachment being a special standard rim and wire support for the globe. For each gas fire and cooker, a separate card is kept; and all subsequent adjustments and repairs are entered on this card, which affords a complete history of the apparatus from the time it left the show-room stores. The card system may, perhaps, in future be extended to fittings and burners, though this would possibly necessitate a larger card.

The members proceeded to the fitters' assembly hall, time office, and fittings department stores, where again the method adopted for issuing work to individual fitters, and recording every man's material and time on each particular job, was of great interest. All work is estimated beforehand, and the orders received are given to the various district foremen, and issued by them to the men. Gas-engines and gas-engine supplies are dealt with by the card system, in a similar manner to fires and cookers—this being a new departure recently adopted by the department to facilitate this branch of work. The members next visited the addressograph room, where the system of book-keeping in connection with this machine was explained. A special metal slip is kept for each consumer's name, and also his address; and the records in the books are made with these slips, while the latter serve also for the addressing of envelopes, &c. In the meter inspector's room, the visitors saw the card system for records of meter states, &c., and the lockers in which the men keep their cash-bags overnight. Each man is responsible for the cash he collects until he has exchanged it for the banker's tab. The book of cards representing each man's day's work, which usually comprises about forty cards (in the case of wet meters, which need attention as to water-level), is sent upstairs to the general office, where, by means of the comptometer, the total gas consumtion and its money value are rapidly assessed and checked. The comptometer has been found of great service in the coke, audit, and accountant's offices. By means of the machine, it is possible to add, subtract, multiply, and divide, and work out discounts and percentages, with accuracy.

In the accountant's office the Hollerith tabulating machine was seen working; and the Accountant (Mr. E. Cooke) explained its uses. In connection with a very extensive card and cost system, this machine is of immense value, and enables the total cost of all work and wages to be rapidly obtained. The principle of the machine lies in the passage of electricity through perforations in the cards, the location of the hole determining what result the tabulating machine shall register. The cards are punched by a hand-operated punch, provided with keys like a typewriter. At the end of the week the information recorded on the cards is analyzed by handing over the cards to the sorting machine, which sorts them into the various cost number groups at the rate of 250 per minute. These sub-bundles of cards are put through the tabulating machine, and the total against each cost number is tabulated. The great value of the machine lies in its speed and accuracy, which enables total cost and cost per 1000 cubic feet to be obtained for any job or plant in a very short time, so as to be of real use.

The members were then conducted over the large general office by Mr. A. W. Tooby (the Office Superintendent), who explained the modern methods adopted for making out invoices and entering up day-book sheets at one operation, and also for arriving at the total gas consumption, from the meter inspectors' cards as already mentioned. One special advantage of these modern methods, besides facilitating the daily work, lies in the fact that at the end of any particular period, such as the month or half year, the balance may be obtained in a few hours, instead of in two or three days, as formerly. The books are all carried on trolleys, the tops of which are arranged as reference desks; and the trolleys are taken below to the strong rooms each night.

The visitors briefly inspected the commercial section office, where the system adopted for the maintenance of gas cookers, fires, and gas-heated hot-water apparatus was explained; and the distribution office, where Mr. G. Ball (the Inspector of Mains and Services) exhibited samples of drawings, sketches, and records of mains, a map of the area of supply, and distribution curios. In the high-pressure laboratory, various appliances used in industrial heating, &c., were exhibited and demonstrated by Mr. C. M. Walter (the High-Pressure Laboratory Superintendent).

The members then repaired to the staff dining-room; and after briefly inspecting the model working kitchen and reading-room attached to the dining-room, they were entertained at tea.

The PRESIDENT proposed a hearty vote of thanks to the Birmingham Gas Committee for their kindness in allowing the visit, which they had all found exceedingly interesting and instructive, and to Messrs. S. R. Barrett, A. W. Tooby, E. Cooke, and R. J. Rogers, for the kind and able manner in which they had shown the members all they possibly could in the short time at their disposal.

Mr. B. SKIDMORE, Junior Vice-President, seconded the vote, which was very warmly accorded.

Mr. S. R. BARRETT replied to the vote of thanks, and said he was glad to have been able to show the members round the various showrooms and offices, and to explain to them the machines and devices for dealing with the huge amount of work which now obtained. In the course of a humorous speech, he described himself as a man of the old school, and said he was often amazed at the rapidity with which things moved at the present time, but the up-to-date character of the arrangements and methods which the members had had the privilege of seeing were evidence sufficient to prove that Mr. Barrett and the other responsible officials of the department had kept pace with the advance he had himself mentioned. He reminded the members of the great contrast between the present time and the early days of the department, when the office work was done by the Secretary and one assistant; while only one fitter was employed, who was sometimes given as much as half-a-crown to buy fittings to instal in a consumer's premises.

Messrs. TOOBY, COOKE, and ROGERS also replied to the vote,

The HON. SECRETARY then announced that, in view of the fact that no annual general meeting had yet been held, he wished to inform the members that the Council had decided at a recent meeting that the present officers should remain in their respective offices until the end of the war, or at any rate for the whole of next session. The President had been approached on the matter, and had consented to continue his services to the Association in accordance with the wish of the Council. Referring to the proposed arrangements for next session, it had been decided to hold only two, or at most three, meetings; but, of course, future events might bring about some modification in this plan. He remarked that, while they all realized the importance of avoiding such waste of time as would be implied by a normal programme—even assuming one could be arranged, which he thought extremely improbable—yet it would not be wise, in the opinion of the Council, to suspend the meetings altogether, unless events should transpire which would render such a course imperative.

Mr. G. C. PEARSON, the Senior Vice-President, proposed a vote of thanks to the President for his services to the Association during the past session, and for his kindness in consenting to remain in office until the end of next session. He said that the session had been very far from normal, and it was largely owing to the President's efforts that the programme had been as good as it had. He hoped that the arrangements for next session would compensate, in a manner, for the curtailment of the present one.

Mr. B. SKIDMORE, the Junior Vice-President, in seconding the vote of thanks, said they were all much indebted to the President for consenting to remain in office.

The vote was very heartily accorded.

The PRESIDENT, in replying, said he would do his best while retaining the presidential chair for another session; and he hoped to be able to invite the members to visit Knowle and Solihull before his lengthened term of office was over. It had been impossible to make arrangements for the visit to take place during the present session owing to various reasons directly arising out of the effect of the war.

SATURATED HYDROCARBONS OF "VACUUM TAR."

In a previous issue of the "JOURNAL" [Vol. CXXIV., p. 814] an account was given of the researches of MM. Aimé Pictet and Maurice Bouvier on the distillation of coal at low temperature and pressure, with the production of "vacuum tar." They have further studied the hydrocarbons contained in this tar; their investigation being greatly facilitated by the fact that the Société pour l'Industrie Chimique, of Basle, distilled about a ton and a half of Montrambert (Loire) coal under a pressure of 6-10ths to 8-10ths, and in this way put them in possession of 132 lbs. of specially prepared tar. This they treated in the way they had previously described, but with certain differences. These are indicated in a communication to the "Comptes Rendus," from which the following particulars have been translated.

In order to separate the saturated from the non-saturated hydrocarbons, they abandoned their method of treating the mixture with fuming sulphuric acid, as it had the disadvantage of not allowing of the recovery of the non-saturated carbides, which could only be very imperfectly extracted from the compounds they form with sulphuric acid. This process was consequently replaced by that of Edeleaunau, which is utilized in refining crude petroleum, and consists in agitating the mixture of hydrocarbons with liquid sulphurous anhydride. This dissolves only the non-saturated compounds, which are then recovered by simple evaporation or distillation of the solvent. When applied to vacuum tar, this treatment produced the same results.

Hitherto MM. Pictet and Bouvier had only dealt with the part insoluble in sulphurous acid. Its fractional distillation at atmospheric pressure gave them four new well-defined compounds, which, added to those previously described ($C_{10}H_{20}$ and $C_{11}H_{22}$), increases to six the number of liquid hydrocarbons hitherto extracted from this tar. All these hydrocarbons have the same percentage composition, corresponding to the general formula C_nH_{2n}. They form a continuous homologous series, and are probably homologues of cyclo-hexane. It has not, however, been possible to determine their constitution exactly, except in the case of two—the carbide $C_{10}H_{20}$, already described, and the new carbide, C_9H_{18}, which must be regarded as a hexahydromesitylene (it gives dinitromesitylene when it is treated with nitric acid).

The principal properties of these hydrocarbons are as follows:

	Boiling Point.	Specific Gravity.	Index of Refraction at the Same Temperature.
C_9H_{18}	135°—137° C	0·7590 at 20° C.	1·4212
$C_{10}H_{20}$	160°—161° ,,	0·7680 ,, ,,	1·4272
$C_{10}H_{20}$	172°—174° ,,	0·7765 ,, 23° C.	1·4196
$C_{11}H_{22}$	189°—191° ,,	0·7838 ,, 22° ,,	1·4234
$C_{12}H_{24}$	211°—213° ,,	0·7862 ,, 21° ,,	1·4293
$C_{13}H_{26}$	227°—229° ,,	0·7953 ,, 20° ,,	1·4379

As before, the investigators compared the properties of these hydrocarbons of coal with those of petroleum hydrocarbons; they were again able to note almost complete harmony with the carbides extracted by Mahery from Canadian and Californian petroleums. This is shown by comparing the figures in the preceding table with those given by Mahery, which are as follows:

	Boiling Point.	Specific Gravity at 20° C.	Index of Refraction.
C_9H_{18}	135° C.	0·7591	—
$C_{10}H_{20}$	172°—174° C.	0·7770	1·4149
$C_{11}H_{22}$	189°—191° ,,	0·7832	1·4231
$C_{12}H_{24}$	212°—214° ,,	0·7857	1·4289
$C_{13}H_{26}$	228°—230° ,,	0·7979	1·4440

Thus there appears to be identity among both products.

Distillation of vacuum tar cannot be continued at atmospheric pressure beyond 240° C., as above this temperature there is decomposition; but continuing the operation under reduced pressure (6-10ths) the authors were able to obtain a further considerable quantity of product. These superior fractions partially solidify by cooling. By washing with cold acetone, they succeeded in separating the solid parts, and by repeated crystallization of them in the same solvent they obtained fine colourless needles, fusible at from 62° to 63° C., and with a specific gravity of ·9128 at 25° C. Their formula is $C_{30}H_{60}$. This solid hydrocarbon is saturated, and belongs to the same series as the preceding. The presence of this carbide was noticed in the product directly extracted from coal by means of boiling benzine. It therefore pre-exists in coal, and does not form during distillation. It is also found in certain petroleums. The authors extracted considerable quantities from Galician petroleum paraffin. Finally, strange to say, it is identical with the metene obtained by Brodie in 1849, by dry distillation of beeswax. Careful examination of the products from these four sources demonstrated their perfect identity.

Output of Coal in Germany.—The effect of the first five months of the war on the output of coal in Germany is evident from the statistics which have recently been issued for last year. The total production in thousands of metric tons was: Coal, 161,500 in 1914, against 191,500 in 1913; brown coal or lignite, 83,900 in 1914 against 87,100 in 1913; coke, 27,300 in 1914, against 32,100 in 1913; coal briquettes, 5900 in 1914, against 5800 in 1913; lignite briquettes, 21,448 in 1914, against 21,417 in 1913.

NEW CARBONIZING PLANT AT YEADON (YORKS.).

The Yeadon and Guiseley Gas Company having works near Leeds, and supplying gas to the districts of Yeadon, Guiseley, Menston, and part of Rawdon, have been obliged, owing to the ever-increasing demand, to enlarge their carbonizing plant; and this article (for which we are indebted to Messrs. Robert Dempster and Son, of Elland) outlines the method adopted.

The Company was formed about the year 1845, and in addition to the General Act of 1845 governing such companies and the Gas-Works Clauses Act of 1847, the Company are working under three Special Acts, dated 1868, 1880, and 1889. Down to the year 1860, the manufacture of gas was very small indeed, and the growth of the Company in earnest may be said to have commenced with the advent of the late Secretary and Manager (Mr. Edward Lister), who commenced his duties in 1864, and continuously held the office until his death in January of last year.

The growth of gas manufacture every ten years, together with the amount of expended capital, is shown in the following table:

	Manufacture. Cubic Feet.		Expended Capital.
1865	8,873,000	..	£12,706
1875	22,953,000	..	22,944
1885	44,320,000	..	38,489
1895	65,164,000	..	44,211
1905	90,142,000	..	60,490
1914	116,412,000	..	69,797

The average daily production of gas in mid-winter is now just over 500,000 cubic feet.

The old carbonizing plant—eight settings of semi-deep regenerators, erected twenty years ago—was found to be in some respects inadequate; hence the present up-to-date plant was erected. At the end of 1913, on the advice of the late Mr. Lister, it was decided that tenders should be obtained from specialists in carbonizing plants for a steel-framed retort-house and horizontal retort-bench, with stoking machinery and coal-handling plant, of a capacity equal to a daily make of a million cubic feet, with the result that the Directors accepted the tender, designs, and specifications submitted by Messrs. Robert Dempster and Sons, Limited, of Elland.

The contract carried out comprises a steel-framed retort-house, averaging 120 ft. 10 in. long, 64 ft. wide, and 37 ft. 10 in. high from the ground-floor level, with steel slated roof, horizontal stage-floor retort-bench consisting of eight through beds of eight retorts, combined stoking machine, with generating and coal and coke handling plants.

The only available site was one that had been previously used as a tip—the natural ground being a rapid fall from one end to the other. The foundations for the new bench were carried out by a local contractor; and as the site was difficult, a description of the method adopted may be of interest.

Rafts of concrete, 18 in. thick and 23 ft. 9 in. wide, of varying levels, were made under the entire length of the bench. The base at the lowest point was 8 feet lower than the underside of the bench and about 3 ft. 6 in. at the highest point. Concrete walls 3 feet thick, of various heights, were formed immediately underneath the pier and end-walls of the bench. Concrete arches spanned between these pier walls; and the intervening space between the arches and the rafts was filled up solid with *débris*, and finished with a reinforced concrete raft, 2 ft. 6 in. thick, to receive the bench. The whole foundation has answered the purpose very well—not having given way or settled anywhere.

The retort-house consists of a steel framework of 10 inch by 5 inch vertical steel joists, placed at 10 feet centres, braced longitudinally by steel ties, then filled in with 14-inch and 9-inch red-brick piers with 4½-inch panels. The whole is rigid, but of light appearance. Ample provision is made for ventilation and light.

Spanning between the walls are eleven steel pitched roof principals, trussed with flat and angle steel trussing; each principal being fixed lineable with the vertical joist uprights of the building, to which they are firmly secured. The roof principals are braced by angle steel wind-ties, and slate purlins of 2 inch by 2 inch with ¼-inch angle steel, to receive Welsh "Duchess" slating; while centrally there is a ventilator 9 ft. 6 in. wide extending practically the full length of the house.

The new carbonizing plant consists of eight through beds, each containing eight retorts 22 inch by 16 inch Ω shaped, 20 ft. long, arranged in two vertical tiers of four each; room being left in the house for future extensions. The arches are 8 ft. 9 in. span, semi-circular in shape; the total height inside the arch from the top of the foundation being 18 ft. 6 in.; from the ground floor to the stage floor, 8 feet; and from the stage floor to the inside crown of the arch, 10 ft. 6 in. The regenerators are the well-known Brooke's patent tubular type—one furnace heating the through setting of retorts. The chimney, 70 feet high, is outside the house.

The bench, furnaces, and settings are substantially braced with 12 inch by 6 inch and 10 inch by 5 inch buckstays and cross-stays; the cross ties being further braced with T steel ties and joists, supporting the hydraulic mains. The end buckstays are 16 inch by 6 inch, well braced, and tied with 2-inch diameter tie rods. Five tiers of rolled-steel joists brace the settings and support the mouthpieces; the furnaces also being braced horizontally and vertically.

The gas leaves each through retort by means of one 8-inch pipe on the discharge side of the bench; the mouthpieces being self-sealing. The three top rows are provided with tar shields for cleanliness in working.

The hydraulic mains are independent of each other, supported on cast-iron stands secured to the running joists on the top of the cross stays. They are 2 ft. 6 in. wide and about 12 inches deep on one side, gradually tapering down to 2 ft. 1 in. deep on the opposite side, where the 6-inch tar-outlet is situated. Only 2 feet of the width of this hydraulic main is utilized as a gas space; the remaining 6 inches being curtailed-off by a cast-iron plate carried well below the dip-pipes, and for the full length of the main—thus leaving an open lute, and enabling thick tar or pitch which might possibly form to be removed without interference when gas-making. Over this lute, sheet-iron covers, with handles for removal, are fixed to protect from dust. Each hydraulic main is independently supplied with liquor from an overhead tank fixed alongside the gable wall of the house.

The gas is taken away through a 10-inch pipe from the top of each hydraulic main through a 10-inch valve into an 18-inch steel

The Toogood Retort-Charging Machines.

foul main; while tar is removed by a 6-inch tar-main coupled-up with ample fall into a steel tar-tower.

The width between the bench and the subway wall on the charging side is 8 feet, the depth is also 8 feet, and the width from the bench to the wall of the house on the discharging side is 22 feet. The depth is 9 ft. 10 in.; the foundation being stepped-down, which makes clinkering much less laborious, and by efficient ventilation leaves a cool floor.

Both stage floors are constructed of steel joists, concrete arches, and brick paving. On the discharging side, the stage floor is stopped short of the house wall and railed off.

A railway and siding not being available, all coal is carted and tipped into a 7-ton coal receiving hopper; a reciprocating "Sure-Feed" regulating the supply to a powerful four-roll breaker. The coal is fed by a shoot to a bucket elevator, close cased, and heavy cast malleable buckets of 24-inch pitch deliver direct to a push-plate conveyor for filling the continuous overhead hoppers. Both

INTERIOR OF THE NEW RETORT-HOUSE AT YEADON.

elevator and conveyor are of 20 tons per hour capacity. Each hopper has four outlets and is fitted with two sliding doors. The "Sure-Feed," the coal-breaker, and the elevator and conveyor are all driven by a 20 B.H.P. totally-enclosed motor, with the usual slow-starter.

The engine-house is 21 feet wide by 28 feet long inside, and 11 ft. 6 in. high. It adjoins the retort-house, which it matches—being constructed of steel joists, braced with steel tees, and filled in with brickwork, covered in by steel roof, with tongued and grooved match boarding, felted and slated.

The building contains at present a 60-H.P. gas-engine and generator, capable of dealing with the whole of the load required—being complete, with electric ignition, &c. A duplicate engine and generator are on order, and will, when completed, drive the countershaft fixed to one side of the house, so that either engine can drive either generator.

The present-day revival of horizontal retort carbonization in the face of vertical retort competition is said to be due, in great measure, to the recent improvements and simplification of stoking machinery and hot-coke handling appliances. This being so, the stoking appliances introduced with this new installation call for special mention, as there are novel features of interest embodied therein. As has been already stated, the retorts are of Ω shape and have specially large radii in the corners, to give great strength to the moulded retort, which is made from silicious refractory material. To obtain the benefits of modern heavy charging into these shaped cross sections of the retort, the principle of projecting the charge of coal was decided upon, whereby the weight of the charge can be varied *ad lib.* according to the requirements of the gas engineer. The charging machine employed (Toogood's patent) produces a charge possessing a physical characteristic of utility. The coal after charging will prove on examination to be stratified—the slack will lie on the retort bottom, and the lumps will lie on the slack. This most desirable characteristic is, of course, due to the greater momentum of the lumps, as compared with the slack, and is especially beneficial where relatively heavy charges are in use, as it will be apparent that the dense lying slack, being in contact with the heated retort, absorbs the heat by conduction, while the open formation of the superimposed lumps assists in the escape of the evolved gases, and permits the radiant heat from the crown of the retort to penetrate the charge more freely.

The outstanding feature of this Yeadon stoking machine is that the charging machine and the pusher discharging machine are

THE RETORT-HOUSE, WITH THE TIPPING TRUCK FOR COKE.

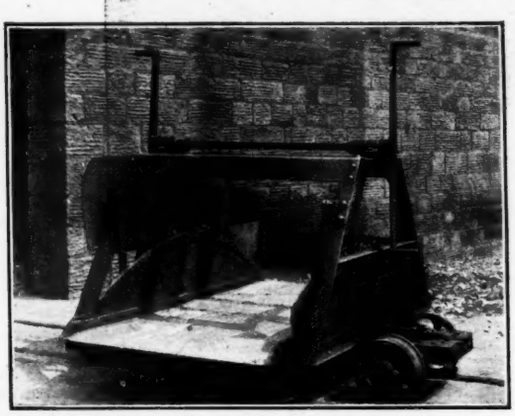
grouped so that they lie on the axis of the particular retort being stoked. Hence the same retort can be discharged and inspected, the ascension pipe augered, and the retort charged without moving the machine in any way whatever—thereby coupling the advantages of the single-stroke machine to the undoubted merits of independent machines. The machine can completely stoke a retort at one setting, or in the event of emergency (say, an accident to the pusher discharger) the charging machine may continue to perform its duties, or *vice versâ*—a factor of moment, especially to the smaller works.

The framework of the machine is naturally high, to permit of stoking the four tiers of retorts. Otherwise the overall dimensions of the machine are very compact, measuring from the sealing face of the mouthpiece 14 feet, and from the centre line of the retort being stoked 5 ft. 9 in. to the right hand and 4 ft. to the left hand—equal to a total width along the rails of 9 ft. 9 in.

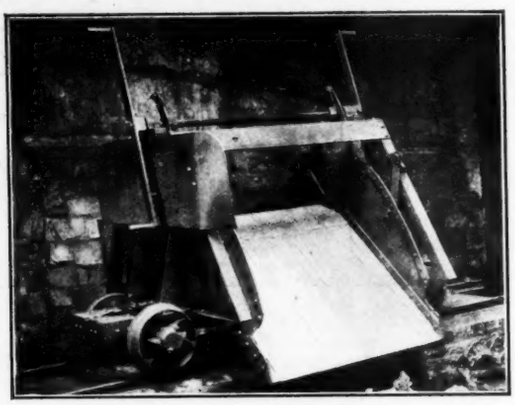
The stoking machine is fitted with the usual appliances to bring the machine to each retort; the traversing and hoisting being performed by an electric motor carried on the main framework—the actual stoking operations being actuated by another electric motor carried on the suspended cage of the machine. Hence all motions are electrically driven by power generated by the gas-driven dynamos previously described.

The quality of the coke, though exceptionally good before the introduction of the new carbonizing plant, has been much improved; and as it has lain in the coke store it has been commended by several gas engineers who have seen it. The reason of the improvement is really due to the compact nature of the heavy projected charge and to the gentle treatment it receives by the handling and quenching in bulk with the special ball-bearing trucks.

The truck for dealing with the coke from the bottom retorts is of unique construction, and is well worth a brief description. The bottom retorts being only 18 inches above the ground-level, it seems at first impossible to design a truck which can contain the coke from a heavy charge from a position so near the ground, and yet discharge it without the help of a hoist, elevated gantry, or shovel work. Yet this is precisely what this unique truck does accomplish. The truck consists of two flat trays, suspended on their centre of gravity, and hinged together so that everything is on a balance. When in position opposite the retort, the trays occupy a flat horizontal position near to the floor—in which position the coke is received and quenched. To discharge the truck, the rails are taken up a slight incline—some 1 foot only above the yard level—and, by a pull on the lever, the balanced trays are oscillated into a pent-up position and the coke is spread on the floor with the very minimum of breakage and effort. The lever motion, with the single pull, locks the trays in either position; and the wheels having ball-bearings the effort to propel the truck is of the slightest. The truck offers an excellent solution to the long-standing problem of dealing with the coke from the bottom retorts without machinery or shovelwork.



The Coke Tray in the Horizontal Position for Receiving Coke.



The Coke Tray in the Bent-up Position for Discharging the Coke.

At present the coke is stored in the old horizontal retort-house, but eventually the natural topography of the site will be utilized by forming gantries at the discharging floor level, and stacking coke in the low-level yard at present occupied by workmen's cottages, or by some method whereby the coke can be more readily taken to the covered store.

The plant has now been in operation for some four months, with satisfactory results to the Company; but results as to the cost of working and as to yield of gas, &c., will be held over until a full twelve months' working has been accomplished.

BRITISH COMMERCIAL GAS ASSOCIATION.

An Invitation to Non-Subscribing Undertakings.

The Manchester District Committee of the British Commercial Gas Association held a meeting last Wednesday at the Blackburn Town Hall, to which were invited representatives of the non-subscribing gas undertakings in East Lancashire. In both the Manchester district and Wales special letters had been sent from subscribers to the non-subscribers, pointing out what had been done by the former for all the undertakings in the district, and appealing to the latter, as neighbours, to bear their fair share of the cost.

In the unavoidable absence of the Mayor (Alderman William Thompson, J.P., a former Chairman of the Gas Committee), the members were welcomed by Alderman Nuttall, J.P., the present Chairman of the Gas Committee, Mr. J. Wilcock Holgate, the Deputy-Chairman, Mr. Ernest Hamer, J.P., Mr. W. Hammond, Mr. B. Hall, and the Town Clerk, Mr. Lewis Beard.

A Hearty Welcome.

Alderman Nuttall said he was sure the Mayor of Blackburn would have liked to have been present at the meeting, and to have taken part in the deliberations. The object of the meeting was, he understood, to enrol as members of the British Commercial Gas Association non-subscribing undertakings in the district, of which Blackburn was one. Blackburn had, perhaps, been lacking in enterprise; but they had recently appointed Mr. A. Morton Fyffe as Engineer and Manager. Mr. Fyffe, he said, was recognized in the gas profession as being a "live" man, and he (the speaker) thought that under his management, and with the support of the Gas Committee, the Blackburn Gas-Works would be brought to the equal of anything of the kind in the country. He was sure that Mr. Fyffe must take it as a very great compliment—in fact, the Gas Committee of the Blackburn Corporation took it as a great compliment—that at so early a date following his appointment as Gas Engineer, his colleagues should have chosen fit to come to Blackburn and give him their hearty support. This showed the good feeling existing in the profession of different managers in various parts of the country. The benefit of meetings like this could hardly be over-estimated, because they were not only of great benefit to the managers, but to the undertakings in which they were interested. He had much pleasure in calling upon Mr. J. G. Newbigging, M.Inst.C.E., the Chief Engineer of the Manchester Corporation Gas Department, the District Chairman of the Association, and the President of the Manchester District Institution of Gas Engineers, to take the chair. He hoped the meeting would be instructive not only to Blackburn but to the county generally.

Mr. Newbigging took the chair, and had on his right Mr. F. W. Goodenough, the Executive-Chairman of the Association. To his left was Mr. G. S. Frith, of Runcorn.

Among the number of apologies for absence was a letter addressed to Mr. W. M. Mason, in which Mr. Alderman Phillips, of Salford, stated that he regretted that an engagement in London would prevent him being present. He continued:

> Among other Institutions the "B.C.G.A." is a notable instance of the great advantages to be derived from more frequent intercourse and the pursuit of our common purpose. No meeting takes place at which there is not some valuable suggestion; for many of our difficulties are common to all and most of us. Thus the new spirit of comradeship in itself puts heart into one, and keeps up the determination to afford to our own district advantages, methods, or facilities which have been appreciated elsewhere. Then, again, what can be done by many in combination is quite impossible in many cases by separate undertakings; and if

the case of the "B.C.G.A." rested solely on the splendid series of literature issued for the benefit of all the undertakings, it would have maintained its claim that all should unite.

But the literature so finely illustrated is not by any means all. The widespread advertising in all the principal newspapers and periodicals, the responses given to the multitude of inquiries which the advertisements have brought forth, the very practical advice and assistance always at call—all these form what should be an irresistible claim for co-operation; for no undertaking large or small, near or remote, can fail in some way to be benefiting by these efforts to popularize gas, and the knowledge of the value of gas appliances in the home, cottage, mansion, hospital, workshop, &c. And no undertaking would not desire to stand its "corner" in this common movement for the benefit of all.

The Chairman said he desired to thank Alderman Nuttall and the Gas Committee of the Blackburn Corporation for placing accommodation at their disposal for the meeting. He was, however, somewhat disappointed at the attendance; but many were doubtless prevented from attending owing to Committee meetings. However, if as a result of the meeting that afternoon they were able to convert those present, this would be something gained. The object of the meeting had been pretty well explained in the circular-letter sent to them. The Manchester District Committee, however, did not consider that it would be wise to allow the matter to rest at sending the circular-letter and the accompanying literature. They thought it would be better to come face to face with the non-subscribers to the British Commercial Gas Association and have a discussion on the subject. He (the Chairman) did not wish the meeting to assume in any shape the character of a formal meeting; he wished it to be quite informal. They cordially invited questions from anyone, and trusted that they would be able to consider them satisfactorily. They also invited any criticisms or suggestions on the working of the Association. He was very sorry indeed that his Chairman (Alderman Kay) and Alderman Phillips were not present, because they had taken such a very active interest in the working of the "B.C.G.A.," and been very closely associated with it in all its workings. But they would be glad to know that these gentlemen were engaged on important business, in London, connected with gas undertakings. They were interviewing members of Parliament regarding coal prices and coal supplies—a most important matter to-day for all gas undertakings—and he hoped they would meet with some measure of success in this matter. ["Hear, hear."] Although Mr. Kay and Mr. Phillips were absent, they had other speakers well qualified to put the case of the British Commercial Gas Association before the meeting. They had Mr. F. W. Goodenough, who had been associated with the "B.C.G.A." ever since its inception, and had, in fact, taken *the* leading part. Harking back again to Manchester and Salford—they would, he was sure, excuse him referring again to these two places—their subscriptions amounted to nearly £1000 per annum. The shrewd business men of Blackburn would doubtless know that Manchester and Salford would not pay subscriptions totalling this figure if they had not strong reasons for doing so. It would be contrary to the spirit of both Lancashire and Yorkshire men. [Laughter.] He (the speaker) only wished that Mr. Kay and Mr. Phillips had been able to attend; they would have given them ample reasons for their support of the work of the Association.

Manchester's Remarkable Increase.

In Manchester, during the last five years they had increased enormously in the letting-out of gas appliances for other purposes than lighting, and some of the credit for this progress should, he thought, be given to the influence of the work of the "B.C.G.A." In 1911—the year the British Commercial Gas Association was formed—they had in Manchester 181,356 consumers; the proportion of cooking and heating appliances to consumers being 46·6 per cent. Of course, there were other consumers who purchased gas appliances outside the Department, and of these they had no exact record. In 1915, the number of consumers had increased to 189,201, and the proportion of cooking and heating appliances to consumers had advanced to 71 per cent.—*i.e.*, an increase of 24·4 per cent. in five years. He did not say this increase was entirely due to the work of the British Commercial Gas Association, but had his Chairman been present he was sure he would have attributed it in a very great measure to the work performed by the "B.C.G.A." in spreading knowledge of the uses of gas for purposes other than lighting. The objects of the Association were, of course, to bring before the public the advantages of extending the consumption of gas, particularly (as he had already said) in the direction of purposes other than lighting. It was important that this should be so. Not only did it bring grist to the mill of the undertaking, but it served the more important purpose of diminishing the smoke nuisance—a vital matter to the health and prosperity of the inhabitants of any district. He was sure that in the last few years, since they had increased the use of gas appliances so extensively, there was a marked difference in the Manchester atmosphere. ["Hear, hear."] For this alone the Association was worthy of every support.

In what was known as the Manchester district there were 202 gas undertakings. Some 42 per cent. of them were subscribers to the work of the Association. The remaining 58 per cent. did not contribute. The Manchester District Committee, however, were determined not to relax their efforts until they had convinced the remaining undertakings that it was to their advantage to become subscribers.

Not a Mere Advertising Machine.

It seemed hardly fair, Mr. Newbigging proceeded, that 42 per cent. of the undertakings should pay the cost of work which benefited all other undertakings. With regard to the work done by the Association, he was not one of those who believed that the "B.C.G.A." should simply remain a huge advertising machine. Advertising was certainly very necessary and very valuable, but he thought it by no means represented the complete work which he hoped the Association would be able to carry out. He thought that by the engaging of experts to visit the districts of subscribers in order to place before the heads of industrial concerns and others the advantages of increasing the use of gaseous fuel as against solid fuel, much important work could be carried out, and this would be of immense benefit to the undertakings concerned. There was a tremendous field for research work. Naturally, the funds of the "B.C.G.A." were limited, and they could not branch out into the different spheres of work which he thought was necessary for an Association of this kind unless the whole of the undertakings of the country were enrolled as subscribers. He was glad to see with them that day Mr. Goodenough, and though he had not, as yet, had any conversation with that gentleman on the matter to which he had just alluded, he was sure that he would agree that the work of the Association was somewhat restricted—as there were so many undertakings that did not subscribe to the work of the Association. They should all remember that the gas industry to-day had not the monopoly it enjoyed twenty years ago; and unless they brought the advantages of using gas before the public in an up-to-date manner, they could not hope to make the progress they desired.

No Opposition to Electrical Undertakings.

He was not going to suggest that there should be any strong opposition between electrical undertakings and gas undertakings—particularly in towns like Blackburn and Manchester. Nevertheless, they had to push their wares, and it was the duty of every chairman, vice-chairman, and member of committee to do his best for the undertaking that he controlled. He did not mean in the sense of opposition. One thing, however, was certain, and should be borne in mind by gas officials. If the forward policy of gas undertakings was not pursued, the electrical undertakings would step into the breach and take the business from them. He was well acquainted with most of the difficulties that corporations had to contend with in dealing with this subject; but he assured them that the question would well repay the closest investigation. Reverting to electrical undertakings, the speaker said that those in charge of them looked with a considerable amount of envy at the success achieved by the British Commercial Gas Association, and there was no doubt that they would not be satisfied until they had a somewhat similar Association in connection with their industry. He (the speaker) came in contact with some of the best-known electrical engineers in the country, and their feeling was that they had been very slow in organizing themselves with an Association similar to theirs, and, further, that the British Commercial Gas Association had done remarkably well. He had much pleasure in asking Mr. Goodenough to make a statement.

The Association and its Objects.

Mr. Goodenough (who was received with applause) said he desired to associate himself with the thanks expressed by Mr. Newbigging to the Blackburn Corporation for lending a room in the Town Hall for their meeting. He also desired to associate himself with what Mr. Nuttall had said with regard to his friend Mr. Fyffe. All of them in the gas industry who knew him were delighted that he had been promoted to a sphere of operations where he would find scope for the energy he possessed. His colleagues wished him every success at Blackburn. It was very promising for this success, and it was very gratifying to find that he had a Chairman behind him who was prepared to give him every encouragement to bring his undertaking up to a high standard. It was not every gas engineer or manager who had the advantage of a Committee who understood it was the technical man's job to advise them, and to act upon his technical advice. He was very glad to be present at the meeting, but felt that he ought to apologize for being there. He had, strictly speaking, no business to be there, because this was a Manchester District meeting—a meeting for the subscribing undertakings to meet the non-subscribing undertakings, to discuss the matter from a district point of view, and to appeal from neighbour to neighbour. He was a London man, from the Association headquarters; but he was asked to come down and take the place (so far as he could) of Alderman Kay and Alderman Phillips, Mr. John Bond, and Mr. Edward Allen. It was rather a tall order to represent four eminent men like these [Laughter], and he did not think he could do it. He was there, however, to tell them all he knew of the British Commercial Gas Association, and to put the case before them as to why the undertakings not at present supporting it should do so. When he came into the Town Hall he saw a notice displayed about a recruiting meeting, and he thought perhaps this related to their gathering that afternoon. After all, their meeting was really a recruiting meeting to enrol non-subscribing gas undertakings in the British Commercial Gas Association, and he hoped they would be as successful in their recruiting efforts as had been those responsible for the National campaign. This was a national as well as a local matter; it was a question of national unity in the gas industry for the betterment of all the undertakings in the country. He desired to emphasize the fact

that the British Commercial Gas Association was not a London or a Southern concern, but it was a national organization. It was no more a London concern than the present war was a London war. The headquarters of the "B.C.G.A." were situated in London because London was the Metropolis, and for no other reason. He found that this fact needed to be emphasized in the great commercial centres of England, and especially in Lancashire. The President of the "B.C.G.A.," Bailie Thomas Paxton, J.P., was a Scotsman, and so was their Secretary (Mr. William Mason), and about one-half of the total income came from the Midlands and the North and Scotland. Manchester, of course, joined at once with London in leading the way in this national movement, and the Doncaster Corporation were also prompt in according the Association valuable support. There was no question of bringing pressure to bear upon any undertaking to subscribe to the British Commercial Gas Association; no pressure at all was necessary. He was quite sure that once the business men of Lancashire and Yorkshire realized that the Association was one they could profit by, they would not want to take the profit at the expense of others.

After further illustrating his point by a racy anecdote, Mr. Goodenough said he was sure the non-subscribing gas undertakings did not want to rely upon others paying for the work of the Association. When once they realized that the work of the "B.C.G.A." was beneficial and profitable, they would—as Alderman Phillips said—be desirous of "standing their corner." What non-subscribers wanted to know was: (*a*) Was the work necessary and profitable; (*b*) what became of the money subscribed; (*c*) could not the subscribers get better value for their money by spending it at home? He would take the first question, "Was the work necessary and profitable?" Well, was advertising necessary? He (the speaker) thought that the man who did not feel that he must advertise the goods he had to sell could not have very much belief in the goods or in the prospects of the undertaking he was associated with. After all, advertising was only letting the public know that they had the commodity the consumer wanted. It was exercising the power of suggestion constantly, so that ultimately the consumer came to want what they wanted him to want.

Ignorance about Gas.

It was both necessary and profitable to advertise gas, because there was—and some gas men had not yet realized it—a very widespread public ignorance in regard to its many uses. The prejudice against the gas-fire had taken a considerable amount of killing; but the Association had worn it down by bringing to the notice of consumers, through their advertisements, the opinion of medical authorities on the subject. There was a greater ignorance in regard to water-heating by gas, and still more as to the uses of gas in industry. The "B.C.G.A." had done much in encouraging the employment of gas for making munitions of war. If it had not been for the rapidity with which gas-furnaces in this country had been installed, the ammunition problem would have been in a much worse condition. Directly war broke out the Association determined to call the attention of manufacturers and of the public generally to the importance of gas, and the greater part it might play in the industries of the country. The question might be raised as to whether a municipality ought to advertise, and whether it was legal for a municipality or a district council to subscribe to the Association. This exercised the minds of a good many civic undertakings in the early days of the Association. The Local Government Board Auditors, however, had passed the subscriptions as necessary trade expenditure. He interviewed the President of the Local Government Board two or three years ago; and that gentleman said then that he fully approved of the objects of the Association and wished it every success—adding that, while he could not give anything in writing regarding the subject, they would find that the Auditors of the Board would raise no difficulties as to the expenditure of the money. It seemed to him (Mr. Goodenough) that it was only a public duty of gas companies and gas committees to advertise and push gas in every possible way, so that the users—both large and small—could get it at the lowest possible price. Mr. Newbigging had mentioned an important matter—the effect on the black smoke nuisance. It was a fact that both in London and Manchester the increasing use of gas appliances for all purposes had greatly improved the atmosphere. As to spending money locally, 30 per cent of all money subscribed in a district was spent in the district. Only 5 per cent., or rather less, was spent in administration. They had an unpaid Board of Directors in the shape of the Executive Committee watching very closely over the administration of the Association. A Board of Directors composed of business men and experts who gave advice and counsel free of charge was certainly going to make things better for everyone concerned than could be the case in any ordinary commercial undertaking. A strong argument for not spending all the money locally was that the Association found that the public paid a lot more attention to advertisements appearing in papers of wide circulation than they did to individual advertising in local papers. A very considerable amount of money had been spent by the Association in advertising in the Technical Press read by architects, builders, medical, and educational authorities (the people who influenced those they all wanted to influence); and he was convinced this was the right policy to adopt both for the present and the future. Then a constant campaign was going on in providing newspapers with articles and news in relation to the usages of gas. The Association had been very successful indeed in getting articles accepted because they were readable; and in this direction they had done some very useful work. Another point illustrated the advantages of centralizing the work of the advertising department of the Association. Good advertising was an art because it needed to be done beautifully, a science because it needed to be done skilfully, and a business because it needed to be done economically. This could only be secured by experts engaged by a body prepared to spend a considerable amount of money. It was no reflection upon any gas manager to say that it was impossible for him to bring the same advertising skill to bear as the experts continually engaged in the business, and whose assistance was always available to the gas manager for advertising in his own district.

One Penny per Consumer per Annum.

They might now pass on, he thought, to the question of whether the expenditure under the national scheme was profitable to each subscribing undertaking. An answer would speedily be forthcoming when they knew the cost represented an expenditure of only 1d. per consumer per annum. The average consumption per consumer was about 33,000 cubic feet, and the subscription to the Association was 30d. (2s. 6d.) per million cubic feet of gas sold. If they could induce the 33,000 cubic feet per annum customer to use 34,000 feet, the extra 1000 cubic feet carried very heavy profit. The experience of subscribers was well shown by the fact that the number was continually increasing. The numbers of subscribers had more than doubled; and those who joined at first were, if anything, now more enthusiastic about the scheme than they formerly were. Some undertakings came in at first on a partial scale only; but they had afterwards increased their subscriptions. Manchester had recently renewed their subscription for three years, which was an excellent testimonial to the value they attached to the work of the Association. As to the opinion of gas appliance manufacturers, they were enthusiastic about the work done. The "B.C.G.A." was a bureau of information for every subscribing member or members; and it was being constantly and increasingly used as such. Members pooled their brains and experience for the benefit of all. It also constituted itself a defence association for dealing with any unfair attacks made either through ignorance or malice. But it was by no means an anti-electricity organization. They had not sufficient money to spend for pushing gas for every business; but they had concentrated with great advantage on pushing the sale of gas as a fuel—a field in which there was a rich harvest to reap in the years to come. Another important point was that the Association existed to provide "ammunition," in the way of advertising literature, for the gas manager for the purpose of his work. Another useful service performed by the Association was when the local undertaking was carrying on a campaign in the local newspapers for increasing gas consumption, they would receive the benefit of the use of the illustrations and blocks employed by the Association for its national work. The Association was also an organization for mutual discussion and stimulus.

The Need of Salesmanship.

Passing to the selling side of the argument, Mr. Goodenough remarked that it still needed to be realized in some quarters of the industry that salesmanship was as important as manufacture. Salesmanship, after all, was the foundation of every business. Efficient service meant a satisfied consumer, and a satisfied consumer was a capital advertisement. If they could count upon the consumer as a satisfied friend, not one who used as little gas as he could, and even then paid the account with very bad grace, they would have accomplished something worth retaining. But this could only be effected through efficient service. New business methods were needed now, and would be as soon as the war was over. The war was bound to make business more difficult than was realized at present. New business methods would be better for the nation and for the industry, because proper gas appliances would make for both domestic and industrial economy. The gas industry was faced with increased costs of manufacture, and increased business was of vital importance. It had been well said that the eternal unrest of the sound business man was the source of national prosperity. They would all have to seek new business ere long; and in this work the Association, by means of the Bulletin" which was published for the information of members and associated members, by the conferences which it held from time to time, the papers read and the discussions that took place upon them, the meetings of the Executive Committee and the General Committees, and the correspondence between the Association and its members—all helped to spread the newer spirit of salesmanship founded on good service. He believed the work of the Association was bringing about a general revitalizing of the whole industry. Energy would take the place of sloth, and knowledge the place of ignorance. Could any gas-undertaking afford to be out of the new movement? The Manchester district had, as he had already said, taken an outstanding part in the movement from the beginning. He was certain that, once the non-subscribing undertakings realized what was being done by their neighbours and other undertakings throughout the country, every gas undertaking from John O'Groats to Land's End, and not only in this country but in the Colonies—for their work was already recognized by subscriptions from Canada, New Zealand, South Africa, Australia, and throughout all the British Dominions—would enrol themselves as members and become staunch supporters of the Association.

The CHAIRMAN said his colleagues and himself congratulated Mr. Goodenough on the way he had presented the case that afternoon. He had not exaggerated in the least. His (the Chairman's) earnest hope was that the statement would bear good fruit among the non-subscribing undertakings.

THE EXPERIENCE OF DONCASTER.

Mr. ROBERT WATSON (Doncaster) said he was sorry that Alderman Armitage, the Chairman of the Doncaster Gas Committee, had been prevented, at the last moment, from attending the meeting. Alderman Armitage had taken a keen interest in the work which the Association were doing, and to-day he was as convinced as he had always been that the work carried out was not only exceedingly useful, but was of great benefit, not only to the gas industry so far as it affected the country, but to each gas undertaking. There was undoubtedly a large field of operations for gas companies in the scheme so ably put forward by Mr. Goodenough. They were able to push their wares to educate their consumers as to the advantages of the newer appliances; they were able to push the gas-fittings business by canvassing and other up-to-date methods which municipalities were precluded from doing because they were not (apparently) working against the gas-fitting firms in a town, or it might be the electrical department, in the particular municipality. He did not think that either gas-fitters or electricians suffered by the forward policy adopted by the "B.C.G.A." It was, nevertheless, a very regrettable fact that, although municipalities had as much money invested in gas undertakings as any gas companies, their return on the moneys invested was not producing the same return. He thought the "B.C.G.A." policy offered immense advantages to those who were unable to advertise and push gas as thoroughly as they would like in their own districts. The national publicity scheme had been a great success. Neither gas-fitting firms nor electrical departments had reason to fear the publicity work issued by the "B.C.G.A." for either national or local advertising. It had been his experience in advocating the larger use of gas-fires that the efforts of his department had resulted in increased work for gas-fitters, and their business benefited in consequence. After a cordial endorsement of Mr. Newbigging's speech, Mr. Watson emphasized the point that any increase in consumption over and above what undertakings were at present securing represented at least something like 50 per cent. extra profit, as the same capital and standing charges were almost unaffected. The work of the "B.C.G.A." had been indicated very clearly by Mr. Goodenough, and it was extremely difficult for anyone following him to add anything new. The undertakings that had been subscribing to the Association knew full well the advantages of membership; they were able at a very small cost to send out expensive pamphlets and literature to their consumers, showing the advantages of the usage of gas for nearly every purpose. He thought that the newspaper advertising was very well done, because he had often found that consumers had not only read the advertisements but had come to the gas-offices to make further inquiries. They wished to know more about the matter, and in many cases the inquiry resulted in increased consumption. Recently he had an inquiry from a firm of lime-burners, who asked him in what way gas could be used on their works. He was able to satisfy their requirements. This was only one of many illustrations which he could quote in support of the case for both national and local advertising.

A BOUNDEN DUTY ON GAS UNDERTAKINGS.

He thought it was their bounden duty to take all the means available for increasing the output of gas, inasmuch as the standing charges were distributed over the greater volume of business. The economic question had been referred to; and he thought the present an exceedingly opportune time to impress upon and induce their consumers to use gas. By recommending the adoption of gas-fires, water-heaters, and other domestic appliances, they would not only benefit the public but help themselves. The only way to do this was to take advantage of the extensive publicity and propaganda work such as the Association offered. Those who joined at the outset of the campaign had continued their subscriptions; but they wanted those who had not joined to join in, not only for their own sake but for the community at large.

THE "B.G.I." AND CO-OPERATION.

Mr. W. D. HELPS, a Past-President of the Society of British Gas Industries, referred to the formation of the Society of British Gas Industries, and said that at the outset of the "B.C.G.A." it was wondered who was going to benefit. Of course, like a lot of shrewd business men, they saw that the burner-man and the stoveman were going to make something out of the new campaign. But, they asked, what was to come to the "heavy man"—the gasholder-man and the purifying-man? All had benefited by the forward policy. The forward policy always advocated by the "B.C.G.A." was for the betterment of all engaged in the industry, and there was not the slightest doubt that it was established on the right lines. So far as his own Society was concerned, they were subscribing far more than they did some years ago. There was, undoubtedly, a general feeling that everybody benefited, and by proper working (as suggested by the "B.C.G.A." policy) all must go forward and increase. There was no doubt the policy of the "B.C.G.A." was a business acceleration in every department of the industry. There was also a feeling in the Society of British Gas Industries that gas corporations and urban district councils were not supporting their undertakings as they ought to do. They (the Society of British Gas Industries) would co-operate with the "B.C.G.A." in all its forward policy.

STOCKPORT'S QUOTA.

Mr. S. MEUNIER (Stockport), the Chairman of the Lancashire Commercial Section of the Manchester District Institution, said he desired to impress upon non-subscribing members the advantages of advertising. He quoted two instances of firms within his area of supply having written for further information through seeing the publicity announcements regarding gaseous adaptation. Both were new comers to the district, and were undoubtedly impressed by the advertisements issued by the "B.C.G.A." regarding the use of gas. He was strongly in favour of the educational policy in regard to both large and small consumers. He had an inquiry for important Government work recently, and was able, through the *ægis* of the "B.C.G.A.," to satisfy all the requirements of the applicant. Mr. Goodenough had dealt pretty fully with the work of the Association and the benefits derived through membership. The Committee of the Manchester Commercial Section had strenuously urged the advisability of united support for the "B.C.G.A." It was very interesting to note from the last report that 38 members of this section were subscribers to the Association, representing an annual gas production of 19,431,094,000 cubic feet; while 21 members, with an annual production of 3,673,287,000 cubic feet, were non-subscribers. While it was satisfactory to report that the "B.C.G.A." could claim 84 per cent. of the annual production, and 64 per cent. of the total membership, the Committee confidently appealed to all members to use their personal influence in securing the full 100 per cent. He asked them to come and join them, and not reap benefits at the expense of the subscribing members.

BOOKSTALL TESTIMONY.

Mr. W. M. MASON, the Secretary of the "B.C.G.A.," said it was not often that when a man thought-out a subject and saw all his points taken by previous speakers that he was happy. He, nevertheless, had had much happiness in listening to the remarks of Mr. Newbigging and Mr. Goodenough. Mr. Goodenough represented a gas company who were contributing over £3000 per year to the Association. If his Directors, as shrewd business men, thought the proposition good, it was undoubtedly worth following. That morning he had called on the manager of the railway station bookstall at Blackburn and showed him a list of papers and periodicals in which the "B.C.G.A." advertisements were circulating. He found that no fewer than sixty-six journals in which the Association's advertisements appeared were sold at Blackburn Station. There were, accordingly, sixty-six papers coming into Blackburn advocating the extended use of gas; and this district (East Lancashire) benefited. He desired to thank them most cordially for the arrangements made for the meeting that day.

ALDERMAN NUTTALL'S RESOLUTION.

Alderman NUTTALL, in moving a resolution heartily approving of the aims, objects, and policy of the Association, said, so far as Blackburn was concerned, the project would have the fullest consideration. He did not think it quite fair that the subscribing undertakings should bear all the expenses incurred in (as Mr. Mason had said) advertising Blackburn gas in sixty-six papers and periodicals circulating in their own district. He thought they should pay some proportion of the charges.

BURNLEY'S POSITION.

Alderman EMMOTT, the Chairman of the Burnley Corporation Gas Committee, in seconding the resolution, said in Burnley they had not yet joined the Association. Mr. Goodenough's remarks had impressed him very much. He agreed with all that had been said with regard to advertising, and considered that it was better to advertise as a body rather than individually. After what he had heard that day, he would have no hesitation in recommending his Committee to join the Association.

NELSON "NEARLY CONVERTED."

Mr. CHARLES TOWNSLEY, the Chairman of the Nelson Corporation Gas Committee, in supporting the remarks of Alderman Emmott, said he, too, had been extremely interested in Mr. Goodenough's statement, and, like Alderman Emmott, he had been "nearly converted."

Mr. ANDERSON, a Director of the Runcorn Gas Company, cordially expressed agreement with the forward policy enunciated by the speakers.

The resolution was then put, and declared to have been carried unanimously.

The proceedings concluded with a vote of thanks to the Blackburn Corporation for the facilities granted for the holding of the meeting.

Messrs. Scott, Greenwood, and Son send us a copy of a book (translated from the German) by K. R. Lange entitled "The Bye-Products of Coal-Gas Manufacture." Pending a fuller notice of the contents of the book, it may be mentioned that the 164 pages, including 13 illustrations and diagrams, deal with: Purification of coal gas; coke; retort graphite; gas tar; gas liquor; treatment of the gas purifying agents; treating the cyanogen sludge; treating the crude liquors; treatment of crude ammonium thiocyanate and cuprous thiocyanate; potassium ferrocyanide; cyanogen pigments; sulphur and sulphuric acid.

WAVERLEY GAS MANAGERS' ASSOCIATION.

Ninety-Ninth General Meeting in Edinburgh.

The Annual Meeting of the Waverley Association of Gas Managers was held in the Cathedral Hotel, Edinburgh, last Friday—Mr. CUTHBERT HAMILTON, of Loanhead, presiding over a large attendance.

ALTERATION OF RULE.

In the minutes of the meeting of the Executive, some reference was made to a proposal by Mr. Gemmell, of Melrose, which was adopted, recommending the Association to alter Rule 8 of the constitution in such a way that members of the Executive, when appointed, should remain in office for two years, and that two should retire annually.

Mr. D. VASS (Perth) suggested that it was advisable that the two retiring members should not be eligible for re-election for one year after their retirement.

It was agreed to adopt the recommendation of the Executive with Mr. Vass's suggestion; and the minutes of the Executive meeting and of the last annual meeting were approved.

THE ACCOUNTS.

The HON. SECRETARY (Mr. R. W. Cowie, of Dalkeith) then submitted the annual statement of accounts, showing an income of £42 0s. 2d., and an expenditure of £20 13s. 2d.—leaving a balance of £21 7s. As the cash in the hands of the Treasurer since last year was £17 2s. 2d., there was an advance this year of £4 4s. 10d.

The PRESIDENT proposed that they should give £5 to one of the patriotic funds—the Prince of Wales's Fund or a local relief fund, whichever they preferred.

Mr. W. S. EASSON (Jedburgh), in moving the adoption of the balance-sheet, said it was very satisfactory.

Mr. HAMILTON (Glasgow) seconded, and the accounts were agreed to.

Thereafter the allocation of £5 to one of the relief funds was discussed. It was eventually decided that the money be given to alleviate the suffering arising out of the Gretna calamity.

LETTERS OF APOLOGY.

The HON. SECRETARY read a number of letters of apology for absence from the meeting.

ADDRESS BY THE PRESIDENT.

Gentlemen,—My first duty is to thank you for the honour you have done me by electing me President of the Waverley Association of Gas Managers. It is, to me, the Association of all Associations. Although I cannot claim to be an old member, my recollections of its work go back many years. It was always an important day with me when the Waverley Association held its meeting, as on that day I was left in charge of the gas-works while my father attended the meeting; and you can imagine the feeling of great importance I had on these occasions. Afterwards, when I became a manager, I attended all Waverley meetings without fail, and hope to continue to do so for a long time yet.

It is with sorrow that I now refer to the loss our Association has sustained by the sudden death of the oldest member—Mr. William Blair, of Helensburgh. Mr. Blair was a member (and latterly an honorary member) of the Waverley Association for twenty-five years, and all who knew him will agree that the Association has lost one of its most faithful and useful members.

EFFECTS OF THE WAR ON THE GAS INDUSTRY.

The circumstances through which we are passing have upset the routine of practically every business in the country, and it is almost impossible to ignore the war and its effects on our industry in my remarks, though I am aware that it has already been the principal subject in so many addresses. I will, however, confine my views to its effects on our industry; and, naturally, the price of our raw material occupies the first place. At the time of writing, the prices quoted for coal give rise to serious reflections. Most managers are weighing the subject very carefully, and are eager for all the information or hints they are able to pick up; and I have no doubt there will be many scraps of paper covered with pencilled figures in the endeavour to forecast the results of the next twelve months.

COAL QUALITY AND GAS YIELD.

It occurred to me that I might put my own views before you, to be corrected and shown my error if you think fit. If, in order to increase your yield per ton of coal, you have to pay more for the coal, I contend that an extra 1000 cubic feet is not by any means so profitable as it seems. If you are getting (say) 10,000 cubic feet of gas from coal costing (say) 17s. 6d. per ton, does it pay to buy coal at 19s. 6d. for the sake of getting another 1000 cubic feet per ton?

The following figures are the averages of fifteen corporation gas-works in Scotland:—

1.	Gas made per ton of coal	10,201 cubic feet.
2.	Gas sold " "	9,459 "
3.	Coke " " "	9·34 cwt.
4.	Tar " " "	11·4 gallons.
5.	Ammoniacal liquor (10 oz.) per ton of coal	35·6 "
6.	Sulphate (per ton)	26·3 lbs.

Average of manufacturing charges:

		Per Ton.	Per 1000 Cubic Feet Sold.
1.	Coal and equivalent	14s. 8d.	18·65d.
2.	Coal, less residuals	5s. 9·14d.	7·28
3.	Purification		0·36
4.	Salaries		0·57
5.	Wages		3·18
6.	Maintenance		2·81
7.	Gross cost in holders		25·50
8.	Net " "		14·13

There is a slight discrepancy in the above figures, but it has no great effect on the purpose for which I have worked them out.

With the foregoing figures as a guide, and assuming the quantity of gas required to be 30,000,000 cubic feet per annum, a comparison of two qualities of coal gives the following results:—

(A) Coal at 12s. and yielding 9,500 cubic feet per ton.
(B) " 14s. " 11,000 " "

1. Cost of carbonizing, repairs, and maintenance = 6s. per ton.
2. Coke = 9 cwts. per ton of coal carbonized and valued at 10s. per ton.
3. Tar and liquor = 50 gallons per ton of coal carbonized, and valued at 5s. 6d. per 100 gallons.

(A) $\frac{30,000,000}{9500}$ = 3158 tons at 12s. per ton = £1894 16 0

1. Carbonizing, &c., 3158 tons at 6s. per ton = 947 8 0 — £2842 4 0

Deduct value of residuals—

2. Coke $\frac{3158 \times 9}{20}$ = 1421 tons at 10s. per ton = £710 11 0
3. Tar, &c., 3158 × 50 = 157,900 gallons at 5s. 6d. per 100 gallons = 434 4 6 — £1144 15 6

Net cost of coal = £1697 8 6

(B) $\frac{30,000,000}{11,000}$ = 2727 tons at 14s. per ton = £1908 18 0

1. Carbonizing, &c., 2727 tons at 6s. per ton = 818 2 0 — £2727 0 0

Deduct value of residuals—

2. Coke $\frac{2727 \times 9}{20}$ = 1227 tons at 10s. per ton = £613 11 6
3. Tar, &c., 2727 × 50 = 136,350 gallons at 5s. 6d. per 100 gallons = 374 19 3 — £988 10 9

Net cost of coal = £1738 9 3

This shows a saving of £41 0s. 9d. in favour of (A), notwithstanding the necessity of having to purchase 431 tons more than is necessary with (B).

I should like to make it clear, before proceeding further, that I quite understand that there is much to be said in favour of high yields, and that it is often a question of circumstance, especially with regard to the local market for residuals. But, in my opinion, if the yield of gas per ton of coal cannot be increased without adversely affecting the production of residuals, then the result is unprofitable; and where the sale of residuals is sufficient to pay the coal account, the selling price of the gas is, almost without exception, remarkably low.

MOISTURE IN COAL AND COKE.

A great deal has been said about the amount of water in washed coal, and the necessity for coal masters making an allowance for the excess of moisture. But I am of the opinion that this is one of the little worries we must put up with, if we continue to use washed coal. It appears to me that if the colliery quotes a keen price, any allowance for moisture must necessarily be reflected in the quotation. Incidentally, I often wonder if those who complain of moisture in coal ever consider moisture in coke.

DELIVERY AND PRICE OF COAL.

With regard to the delivery of coal, I have had no reason to complain, though I have noticed that since the outbreak of war the waggons have taken double the time to come the same distance. Such unforeseen causes of delay or insufficient delivery as a breakdown or accident at the pit, must be allowed for, and treated in the same spirit as we expect to be treated in the event of a breakdown within our own gates; and I am certain that the coalmaster (in the case of a genuine accident) is quite as anxious to resume the supply as you are to receive it. At the same time, it is inadvisable to be dependent on only one source of supply, or, in other words, to put all your eggs in one basket.

So much has been said about what the Government ought to do with regard to the abnormal price of coal that I do not think I can find much to add, except that our industry (using, as it does, over 16,000,000 tons of coal annually) is deserving of a little more consideration. Ten years ago, according to the Board of Trade coal tables, the average price at the pit mouth was 6s. 11d. I should very much like to know what the figure for 1915 will be. While it is possible to understand why seaborne coal is higher in price, owing to the risks at present run by shipping, it is very difficult to understand why prices in the locality of the coalfields should jump to such a height. There is no question of increased carriage, and the miners are not benefiting much by the increase. I have been informed that restricted output with the same oncost charges was partly responsible; but even allowing for this, there

is still about 75 per cent. of the increase that cannot be so easily explained. I suppose the silver lining in the cloud is reflected in the improved prices obtainable for coke and the diminishing heap in the coke yard.

THE COMMERCIAL SECTION AND COKE SALES.

While on the subject of coke, I should like to say a little with regard to the Commercial Section of our Association. I am well aware of the fact that we do not all view the subject from the same point of view; but I must say that, personally, I have gained very little from the Commercial Section. I am willing, however, to be convinced that it is a benefit to others, and would regret to see it discontinued if any member of the Association has derived assistance from it. At the same time I should like to see our Commercial Section something more than it is at present. It was formed on co-operative principles; but there is very little co-operation beyond the exchange of information as to stocks and prices.

There is no guarantee that your neighbour will not cut the price of coke in your own market; and, so long as any undertaking has a large stock to dispose of, and the local market is poor, there is nothing more certain than that the seller will look towards his neighbour's market and, in order to gain a connection in it, cut the price. I have experienced it, and my price at the time was only 11s. 8d. per ton.

We have also the merchant to contend with, who finds a market for the manager who is unable or unwilling to take the trouble to find a market for himself, and he does not hesitate to cut the price. I am not blaming the agent, as it is only good business to do so if he is able. My view is that every manager, or whoever is responsible for the sale of coke, should make it his business to find a market for himself, instead of taking the path of least resistance and asking someone to find a market for him. As a rule, the buyer purchases in the cheapest market, and, so long as the goods are of similar quality, it is of no importance to him whether the price is fair or not.

What we require to do is to infuse a little more co-operation into the working of our Commercial Section; and I would suggest that each member should pledge himself not to undersell any other member—except, of course, in his own local market—unless he has notified his intentions to the member into whose district he intends sending coke; also that the difference in price should not exceed 5 per cent. By limiting the difference in price to 5 per cent. the market would be steadier. I would further suggest that the member, before encroaching on his neighbour's market, should make a similar reduction in the local price. I believe that when the local price, delivered, is the same as the price f.o.r. there will be no need to cut your neighbour's price and sell in each other's markets.

Another point on which I should like to have your opinion is the advisability of holding a meeting of the Commercial Section quarterly, or, at least, twice yearly, to discuss the subject of coke markets or anything else of interest to our business. The meetings could be held at different centres, so that the expense would be, to a certain extent, equalized. With regard to the expense, I see no reason why the respective companies and corporations should not pay their manager's travelling expenses, as they would certainly stand to gain from the conferences.

ADVERTISING.

Although I have not gone in for advertising to any extent, I am certain the British Commercial Gas Association is moving on the right lines, and that advertising pays, whether you are selling gas or anything else that the general public requires. A moderate expenditure on advertising coke in the district would go a long way towards getting customers and a fair price.

My advertising has, so far, been confined to writing to likely customers, canvassing, and by opening a small show-room. I would recommend all small works, as well as large ones, to have a show-room, wherein prospective customers would be able to see the various gas appliances in use. When the window of the show-room is towards the street, an attractive display of globes and fittings should be arranged, and at night the room should be brightly and well illuminated, with a good gas-fire burning where it can be seen from the street.

MAINTENANCE CHARGES.

I find that free maintenance is, to a certain extent, necessary in some districts; and where work is done and a charge is necessary, I advocate moderation in the charge made. For material supplied, I base the charge on the cost of the article *plus* 10 per cent. to cover carriage, breakages, &c. We make no charge for fixing gas fires or cookers which we put out on hire. Gas rings and grills are free and fixed free. They are, in my opinion, a better investment than the more expensive cooker for small undertakings and districts where you have a working-class population. I have had cookers out on hire that, judging from the appearance of the oven and drip-pan, had been simply used as a range plate might be—*i.e.*, for boiling, &c.

In conclusion, I venture to hope that by the time our next meeting comes round the country will be in a more settled state, and that the bogey of militarism will have been driven out of Europe for ever.

WELCOME TO THE OLDEST MEMBER.

The PRESIDENT, before resuming his seat, said he wished to take the opportunity of welcoming their oldest member, Mr. Henry Rutherford, of Aberlady—(applause)—and also Colonel O'Connor, of Edinburgh, and Captain Milne, of Edinburgh. He was sure they were all pleased to see them. He asked Colonel O'Connor to open the discussion on the address.

DISCUSSION.

Colonel HENRY O'CONNOR, who was received with applause, said he had listened with great pleasure to the address. The subject taken up was a very useful one. The analyzing of the costs was, to his mind, one of the most important things that any gas manager could do. He strongly believed in the manager of even the smallest works calculating out the cost of each part of the works as well as the manufacturing costs of the gas. While he could not expect to equal the results obtained in the larger works, it was an excellent thing to be able to compare his own costs with those in the larger works. He was entirely in agreement with the President on the question of supplying grillers and boilers free as compared with giving out gas-cookers to small consumers. Where the price of gas was 4s. or over per 1000 cubic feet, they had great difficulty in getting people to make use of a cooker in such a way as would repay the original cost of it in the matter of gas consumed. Unless they could get people to do so, they were losing by putting out cookers. After an exhibition was held in a small place, they had applications for cookers, which after a few months were returned, dirty and rusty, and not in a condition for hire. They had these on their hands until they got them cleaned up and put in order, and even then they had difficulty in getting consumers to take them. Everybody wanted a new cooker. If they had this loss to add to the original cost, they would find that it was not a paying thing. In the case of a boiling ring or a griller, however, they found that it would be considerably used and quickly return the cost to the company.

Mr. VASS, in congratulating the President on his address, said he thought it should be pointed out, in making comparisons, that purification, salaries, wages, and maintenance were practically constant per ton; but the revenue received from coke would depend entirely on whether they obtained the same price for their surplus stock. In small works it was frequently felt to be very economical to have low yields of gas and high yields of residuals. The only thing was that the manager who had such results was not looked upon as one of the "stars." In his own experience, he frequently found it advisable to buy a third-grade coal in order to have a high yield of residuals. With reference to the hiring-out of cookers, in his district many of the works hired them out free, and they had even gone as far as to hire out gas-fires free. But this would never bring a good return in the case of works which were able to have a very low selling price of gas. After adopting free fires, they had gone back to the hired fires.

The HON. SECRETARY, referring to the remarks in the address on the Commercial Section of the Association, mentioned that at the last annual meeting he had read a short report on the working of the section. It was not particularly successful for the first two or three months of its adoption; but for the year now past the returns had been sent in very regularly by from 16 to 18 works. A good suggestion was made in the address that the Association, or those who sent in their returns, should meet once or twice during the year to compare notes. The question was thoroughly discussed at the meeting in Melrose. There was a striking demand made by one of the members, which he did not think should be repeated. It just showed that when a manager was in a corner to get some of his coke away he did not scruple to enter into another's market. The President referred to the British Commercial Gas Association. If there was any branch of the gas industry that was really and thoroughly alive to-day he fully thought it was this Association. Those who were connected with works that did not subscribe to the Association ought to try to induce their directors to send a subscription. He then read a letter from the Association which asked him to bring before his own body the resolutions recently passed by the General Committee of the Association as to membership. He thought they should appoint the new President and the new Secretary as their representatives on this Committee, and he moved accordingly.

Mr. W. EASSON spoke on the coal question, which, he said, gave rise to serious reflections at the present time. It was somewhat difficult to move in making contracts to-day. There seemed to be an understanding among coal proprietors, so that to get them to listen was quite impossible. They must begin to work out the increased price of gas to their consumers. It stood to reason that if the price of raw material went up, the manufactured article should go up too. He suggested that where gas companies were getting a dividend of 10 per cent. they might sacrifice some of it for the benefit of the consumer in these times. He quite agreed with what Mr. Cowie had said with regard to the Commercial Section. As a manager of a small works, he found that the returns coming in monthly had been a benefit to him.

Mr. J. O'HALLORAN (Edinburgh), speaking for the coal trade, remarked that a high price of coal had always been a grievance with gas managers. The price would never be sufficiently low to satisfy the gas manager. No matter what the price of coal might be, his one interest was to get as much out of the consumer as he possibly could. Speaking seriously, the coal trade had been very greatly handicapped by the shortage in the supply of empty waggons and of locomotive power—and this at a time when it wanted every advantage it could get owing to the shortage of labour. It brought about a condition of affairs that had militated

against the easing of prices. They should look at the matter from a broader basis. It was not entirely the coal master or wholesale merchant who was responsible for the rise in prices. The economic law of supply and demand governed the situation.

Mr. EASSON pointed out that if this had become known to the public, even in small places, they would have been greatly relieved.

Mr. J. B. SCOTT (Cowdenbeath) remarked that much had been said about the attitude of the coal masters in raising prices. It was rather difficult to see whether this was justifiable or not. They noticed that while in the North of England the price of coal had been increased by 5s. or 6s. per ton, the price in Fife had gone up, on the average, by 9s. This meant an increase of about 1s. per 1000 cubic feet of gas, and another 6d. had to be added for increased wages and other costs. So that if they raised the price of gas to the consumers by 10d. per 1000 cubic feet, they were only asking them to pay about one-half the increased costs. A coalowner in Fife had told him that it was not so much a question of price as of getting supplies during next winter.

A discussion followed regarding the recovery of toluol.

The PRESIDENT, replying to the discussion on the address, said with regard to Mr. Vass's remarks on the yield of gas from coal, he thought the gas manager should be judged by his balance-sheet. If the directors or corporations saw that they were going to save £40 or £50, they would not call in question the low yield. They were out for money, and not for gas.

ELECTION OF OFFICE-BEARERS.

The following were appointed office-bearers for the ensuing year:

President.—Mr. John M'Millan, of Lasswade.

Hon. Secretary.—Mr. R. W. Cowie, of Dalkeith.

Auditor.—Mr. John O'Halloran.

Members of Committee.—Messrs. Richmond, of Penicuik; J. D. Keillor, of Hawick; W. Easson, of Jedburgh; and P. Blair, of Haddington.

THE PRESIDENT'S MEDAL.

Mr. EASSON presented the gold medal of the Association to the retiring President, who suitably replied.

NEW MEMBERS.

The following new members were admitted to the Association: Messrs. Wright, of Lockerbie; Chalmers, of North Berwick; Smillie, of Arniston; Gray, of Edinburgh; M'Callum, of Eyemouth; and Toynbie, of Dalkeith.

A VISIT.

In the afternoon the members visited the Scottish Zoological Park at Corstorphine, Edinburgh.

"B.T.H." Steam, Water, and Air-Flow Meters.

The British Thomson-Houston Company, Limited, are issuing an interesting brochure describing their steam, air, and water-flow meters. They point out that steam-flow meters installed in the piping system of power plants will often reveal information otherwise impossible to obtain—showing any source of waste prevailing, and indicating the water-boiler input, the output of the boiler plant, the steam consumption in the engine-room, and the steam used for heating or industrial purposes. Power costs can also be ascertained; and, in addition, an indication will usually be given as to where these costs can be reduced. The meters help to save coal. By using them on the boilers, they show how much steam each boiler is delivering at any time; and with this information there is no need to manage the boilers by guesswork. They indicate when it is time to bank some of the fires, when a certain boiler needs cleaning, and which fireman is getting the best results from his boilers. In other parts of the plant these meters show where the steam is used and often pay for themselves in a short time by indicating where large quantities of steam are being wasted either through leaks or through careless use.

Coal Gas for Railway Carriage Lighting in Germany.

The Central Gas Publicity Bureau of Germany a few months ago addressed an inquiry (at the instance of the Government) to the larger gas undertakings of Germany as to the conditions on which they would be prepared to supply the railway administration with coal gas for use in the lighting of passenger trains, in place of the oil gas which has hitherto been employed. The replies show that ninety works have offered to supply coal gas for this purpose; and they have been put in communication with the railway administration. The prices quoted are not disclosed; but it is mentioned that 75 per cent. of the works offering supplies named a fixed price, and the remainder mentioned figures which diminished with the quantity of gas taken. Two works gave prices varying with the cost of coal. Only one works offered to supply gas of a specified calorific power—viz., 5000 calories gross per cubic metre (equal to 524 B.Th.U. per cubic foot). The railway administration is in most cases to bear the cost of the necessary mains between the works and the railway; but two works stated that this should only be the case if the railway administration ceased to take a supply of coal gas after the close of the war. The necessity for the coal gas supply is, of course, due to the scarcity of oil in Germany.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Badges for Gas-Works Employees.

SIR,—The question of the issue of badges to gas-works employees, which was raised by various members at our annual general meeting, has been referred to the War Office.

A reply has just been received from Major-General Mahon, C.B., C.S.I., stating that the general issue of War Office badges to such employees would not come within official authorization. He considers that, in the circumstances, the most satisfactory solution of giving the employees of gas undertakings a mark to show the nature of their duties would be the issue of a private badge to the men by the undertakings concerned. He states that there is no official objection to such a course, provided the badge does not resemble the official issue. The "Royal Crown" or cypher must not be used as part of the device.

I may add that Messrs. Vaughtons Limited, Gothic Works, Livery Street, Birmingham, supply a badge which is suitable for adoption by gas undertakings.

WALTER T. DUNN, Secretary,
Institution of Gas Engineers.

39, *Victoria Street, Westminster,*
June 14, 1915.

Is the Institution of Gas Engineers a Failure?

SIR,—I feel sure that many of your readers will admire the courage displayed by the writer of the article under this title which appeared in your issue of June 1; and doubtless many more will be in complete agreement with him in the conclusion he has arrived at, and the affirmative answer he supplies to the above query.

The five sins of omission detailed in the article are only too true, but the fifth (or last) in the list is perhaps the most regrettable—viz., "It has failed to open its doors to the best members of the associated industries."

When we reflect that there are something like fifteen or twenty gas engineering firms of repute, controlled and managed by men of undoubted scientific ability and rare experience in all engineering matters connected with gas-works, who are not allowed by the present rules of the Institution of Gas Engineers to become members, it certainly does seem a perfect misnomer to name our Institution an "Institution of Gas Engineers." The absurdity is further pronounced by the fact that there are quite a number of gas managers who make no claim to be engineers, but who can be, and are, elected to full membership, for the sole reason that they are gas managers.

Surely if the "brains of the associated industries" are admitted as members of the Institution of Civil Engineers and the Institution of Mechanical Engineers, such men might reasonably be considered as fit and proper persons to enter the Institution of Gas Engineers! Some of the most important papers on gas engineering subjects which have ever been brought before gas engineers and managers have emanated from gas engineers who are contractors.

Further, I notice that most of the chief engineers and managers of our leading gas engineering firms are usually *invited* to attend the annual meetings of the Institution; and this fact makes it very difficult for gas engineers and managers to understand why our Institution cannot have the advantage and help of these gentlemen, in addition to their presence. No gas engineer can doubt for one moment that the inclusion of such men would do much to advance both the Institution and the gas industry generally; and if the Institution of Gas Engineers is to justify its existence, they must be included.

W. M. VALON.

Stafford Gas and Electricity Department,
June 7, 1915.

SIR,—Mr. Macleod's article on our Institution (I say our Institution, as a twenty years' member) was splendid. It said many of the things that many of us have wanted said, but have left unsaid, waiting on the other man; and he said them with dignity and restraint. Personally, I feel that more could have been said with advantage.

There is an expressive Scotch word, "fushionless," which to my mind describes the failure of our Institution. Many times recently, action should have been taken on points of supreme importance to some of the members in particular and to all of us generally—points like the Huddersfield case and later the Potteries case. Then, Sir, the "JOURNAL" years ago showed how some of us connected with the distribution side more than the manufacturing side were "outwith the pale;" and I can tell you that we have felt it.

Again, our Institution is not National but Provincial in its present constitution—Scotland, Ireland, and Wales have never had commensurate representation on the Council. I will not labour the point, but allow each to verify for himself.

These are briefly a few of the plaints. There are others; but they will keep as against a possible reply to these criticisms—criticisms which are not querulous, but are the outcome of the pent-up feelings of many years. Hope dawned with Dougall and Helps, and set with the Presidents following on, who either could not be fashed, because the Council preferred things as they were to new-fangled ongoings, or had not the personality or character of their predecessors.

Let us hope still for the dawning of a brighter day—a day when speakers will not be told as they get to their feet to "hurry-up," when paper writers need not of necessity be paper readers, a day when there will be brightness and light in our methods rather than lugubriousness.

S. B. LANGLANDS.

Glasgow Lighting Department,
June 7, 1915.

Coal Price Rise and the Cause.

SIR,—At the general meeting of the Midland Commercial Gas Association I was asked to inform you that our members are of opinion that the views expressed by Mr. Edward Allen, of Liverpool, at the recent meeting of the Institution of Gas Engineers, on the question of coal supplies, are abundantly justified.

I have been informed several times by coalowners that the Metro-

politan and Southern gas companies readily pay without demur a much higher pit price for gas-fuel than Midland gas undertakings are willing to pay. There is no doubt in my mind, and this is also the opinion of the majority of Midland buyers and sellers, it is high prices so freely paid by many gas undertakings early in the season which accounts to a large extent for the enormous increase in prices now demanded by coal-owners for the renewal of gas-coal contracts.

Coal outputs are lower than in normal times, in consequence of the large number of men having left the pits for the war, and wages (along with consumable stores) are higher. Hence working costs are necessarily increased, which justifies coalowners asking for an advance on contract renewals. But 5s. to 6s. 6d. per ton is out of all proportion, and not justified, especially as last year's contracts were 2s. 6d. per ton more than in 1911-12.

Personally, I hold very strongly that neither employers nor employees should exploit national needs for undue profit making. Much unrest and several labour disputes are due to the belief that certain sections of employers are making extravagant and unjustifiable war profits. It is most unpatriotic for any class or section of the community to obtain a disproportionate gain, at a time when we are engaged upon vital combat against a great military Power—Germany—who for many years, while professing friendship, carefully prepared for our utter ruin and destruction. Our future existence as a nation depends upon the issue of this world-wide war.

The country's call should be the first consideration, and profit-making (along with most other things) is of secondary importance. Our first business is to bring this war to a successful issue—that is, if we are to avoid the fate of Belgium.

J. Ferguson Bell, Chairman,
Midland Commercial Gas Association.

Derby, June 11, 1915.

[With much of Mr. Ferguson Bell's letter we are in complete accord; no one who is patriotic could be otherwise. But it will be of interest to the administrators of London and southern gas undertakings to learn from the letter that coalowners have several times informed our correspondent that the London and southern gas companies "readily pay, without demur, a much higher pit price for gas-fuel than Midland gas undertakings are willing to pay." We are left wondering whether Mr. Bell really believes this—whether he truly thinks that the art of bargaining for coal is not carried on by gas administrators in London and the South with the same acumen and energy as in the case of the Midland gas undertakings. From what Mr. Bell knows of certain of the London and southern administrators, it is rather surprising that he puts into print a statement such as the one quoted above, although poured into his ears "several times by coalowners." Regarding the point as to the high prices "so freely paid by many undertakings early in the season" accounting "to a large extent for the enormous increase in prices now demanded by coalowners for the renewal of gas-coal contracts," it would be interesting to know whether Mr. Bell is on the same path as Mr. Edward Allen in his remarks at the Institution meeting. Mr. Allen was alluding to the imperative necessity existing for some undertakings (through not getting sufficient deliveries under their contracts) to buy in the open market at almost any price at which coal could be obtained. This they could not help. Necessity compelled. If the words "freely paid" allude to new contract prices, it would be better to advance instances in support of the accusation. Mr. Bell merely says "there is no doubt in my mind." It is not a question as to there being no doubt in his mind, but whether he has the positive proofs of high prices having been "freely" paid. We question the applicability of the word "freely." There is no desire to create any division of feeling within the gas industry over this matter of responsibility for coal prices; but it certainly does seem that there are members of the gas industry who have a very poor opinion of the business ability of other members.—Ed. J.G.L.]

The Institution's Ventilation Committee's Report.

Sir,—We have read with interest your leading article dealing with the report of the Ventilation Research Committee. We appreciate its tone, but would like to call attention to one or two remarks in it, which we think are liable to cause some misunderstanding.

With regard to your reference to the influence of the damper-like regulation of the flow of air into the test room, we should like to call attention to the remarks made in the report [see p. 578 of the "Journal"]: "Tests made with the door closed and the area of inlet increased, showed that up to 12 in. by 12 in. increased ventilation was produced. Greater inlets, such as obtained by opening the door, did not produce any increase in ventilation up the flue." These tests show that the opening 12 in. by 12 in. presents no appreciable resistance to the flow of air into the room. In any case, this resistance is small, compared to that of the flue-vents of the gas-fires tested; the greatest flue-vent area being only 17½ square inches.

The outer room offers practically no resistance to the flow of air, for the area of the openings in both the upper and lower chambers corresponds to 8 square feet.

In an ordinary room, winds may assist the ventilation up the flue, or in certain circumstances may retard it by causing down-draughts. The figures in Table VI. represent the volumes moved up the flue by the gas-fires themselves without the assistance of winds.

John W. Cobb, W. Harrison, } Department of Coal, Gas, and Fuel Industries, The University, Leeds.

Leeds, June 11, 1915.

REGISTER OF PATENTS.

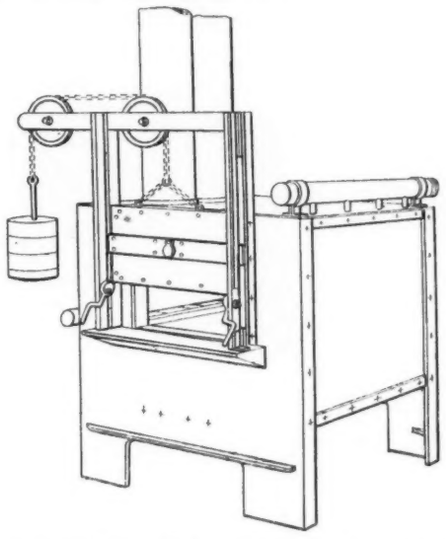
Gas-Heated Furnaces.

King, J., of Latchford, Cheshire, Burnett, J. R., of Hill Cliffe, near Warrington, the Richmond Gas Stove and Meter Company, Limited, of Warrington, and Mead, A., of Sheffield.

No. 8638; April 6, 1914.

This gas-heated furnace is of a kind forming the subject of patent No. 27,686 of 1912; and the object of the invention is "to introduce the gas and air into the furnace in a manner which allows of higher non-oxidizing temperatures being obtained than heretofore."

Gas only is admitted through the usual primary air and gas inlets, while the air for supporting combustion (the secondary air supply) enters, as before, through conduits below the furnace and meets the gas at a point near the gas inlets. In the earlier invention the secondary air enters the furnace by induction; but according to the present invention the air, which now forms the primary supply, is supplied under pressure. For this purpose a rotary fan or compressor is used, which preferably delivers the air to the conduits, *via* an air-pipe closed at one end outside the furnace and lying transversely of the conduits, and having branches which extend into the conduits. With air thus supplied under pressure, and meeting the gas where it enters the furnace, a hot, non-oxidizing flame is obtained.



King, Burnett, and Mead's (Richmond Gas-Stove Company) Gas-Heated Furnaces.

The air may also be superheated prior to meeting the gas by being conducted through a series of pipes passing through the flues, or a series of passages formed in the brickwork of the furnace, according to the type of furnace required.

The gas inlets are slightly in advance of the delivery end of the air-conduits; and at these points the gas inlets are enlarged—"thereby allowing of a more perfect mixing of the gas and air before entering the furnace." The gas and air supplies are controlled by means of taps or valves, and the flue outlets by dampers or valves.

The illustration shows, in perspective, a gas-heated oven furnace with the improvements as described applied to it.

Purifying Gas.

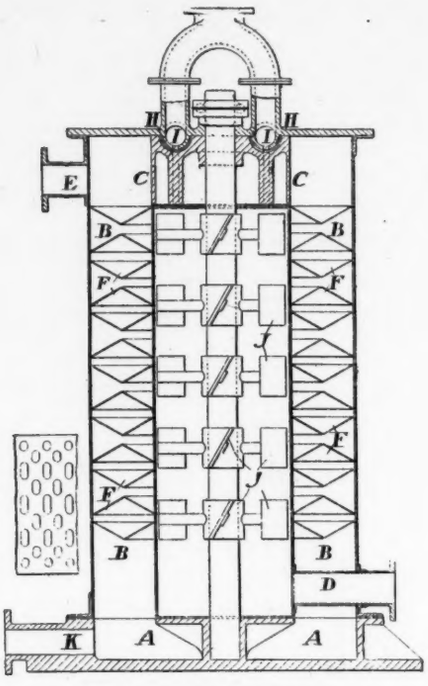
Climie, W., of Glasgow.

No. 11,136; May 6, 1914. No. 23,460; Dec. 3, 1914.

This (combined) invention particularly relates to the class of scrubber for washing gas and extracting tar in which a series of perforated plates are arranged in a cylindrical casing so that the washing water, in passing through the apparatus, is divided into thin streams. The scrubber consists of two concentric casings—the inner perforated one contains a central shaft carrying the blades, while the perforated plates are arranged in the space between the casings, or the inner perforated casing may be dispensed with and discs, instead of blades, may be arranged on the central shaft, while a turbine is arranged on the central shaft at the upper end of it, and the water which actuates the turbine to rotate the shaft is discharged on to the top perforated plate.

A sectional elevation is given [p. 652] of the scrubber proposed for washing the gas and extracting the tar; also an elevation of a portion of the inner casing showing the perforations.

The outer cylindrical casing (closed at its upper end by a plate) is arranged vertically on a foundation preferably consisting of a hollow casting A. An inner cylindrical casing, closed at its upper and lower ends by cover plates, is arranged concentrically within the outer casing, so that a space B is formed between the two casings and so that a space C is left between the cover plate of the outer casing and the top cover plate of the inner casing. The gas inlet pipe D passes through the outer casing into the inner casing at the lower end, while the gas outlet pipe E is at the upper end of the outer casing. The cylindrical surface of the inner casing is perforated above the inlet with holes or slots arranged in staggered or zig-zag formation. In the space B any suitable number of perforated plates F are arranged—preferably con-



Climie's Gas Purifying Apparatus.

sisting of V-shaped and inverted V-shaped perforated plates arranged alternately all round and down the space from the top of the inner casing to above the inlet pipe. A central vertical shaft passing through the centre of the casings is supported at its lower end in a bearing in the foundation plate, and its upper end passes out through the cover plate of the inner casing and through the cover plate of the outer casing, where it is carried by bearings fitted with anti-friction balls.

In the space C the turbine is arranged. The under surface of the cover plate of the outer casing is formed with a concentric ring shaped to enter a groove in the disc plate of the turbine. and formed so that the water in the duct I is discharged through a nozzle into the turbine. The water is led into the duct preferably at two points.

The operation of the apparatus is as follows: Water, on being led into the duct I, flows through the turbine and, passing through the angled holes in it, rotates the shaft. As the water is discharged from the turbine it is directed on to the perforated V-shaped plates F, where it is divided into streams by the perforations. The shaft being rotated, the angled plates or blades J draw in the gas through the inlet D and force it, through the perforations of the inner casing, into the space B, where it meets the stream of water from the turbine, and thus gets purified by the water carrying away the tar. The purified gas is forced out of B through the gas outlet by the blades on the shaft; while the water mixed with the tar is discharged through an outlet K at the lower end of the casing or through the foundation plate A.

Prepayment Gas-Meter Mechanism.

COWAN, W. H., and PARKINSON AND W. & B. COWAN, LIMITED, of Fitzalan Street, Kennington Road, S.E.

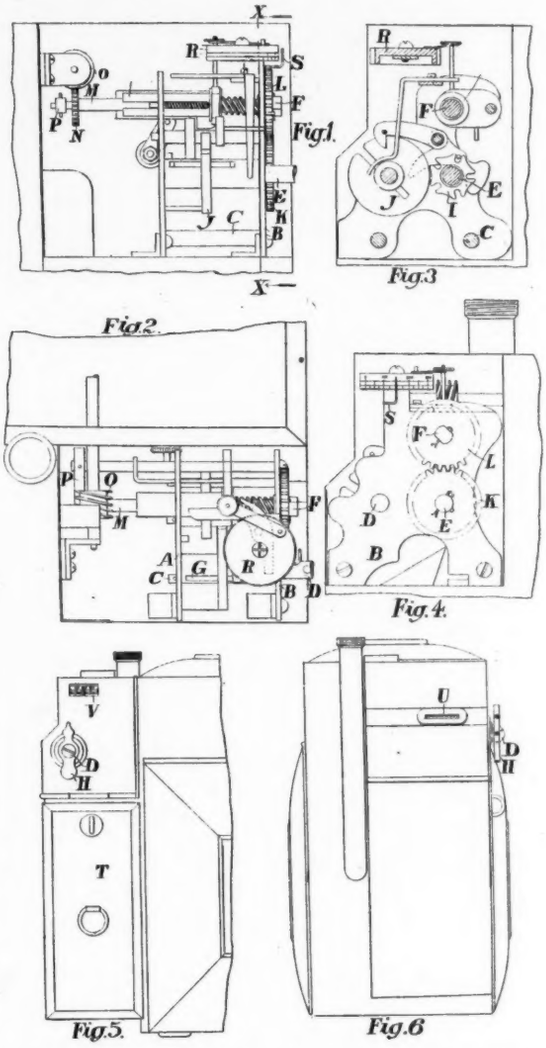
No. 11,628; May 11, 1914.

This invention relates to prepayment mechanism for use in connection with gas meters, and has for its object mainly "to provide improvements in connection with the general arrangement of such mechanism."

Fig. 1 is a side elevation of the prepayment mechanism. Fig. 2 is a plan. Fig. 3 is a section on the line X of fig. 1 looking in the direction of the arrows. Fig. 4 is a front elevation of the prepayment mechanism. Figs. 5 and 6 are a front and side elevation of part of the exterior of the meter.

Two standards A B are arranged to carry fixed separating or distance pieces C, and are journalled to three horizontal shafts D E F. The shaft D within the standard is formed with a coin pocket G, and carries a slotted circular disc J to permit the coins to fall into the pocket only when the shaft is in the proper position. This shaft extends through the standard B; and to the extension a hand wheel H is connected. The shaft E carries a Geneva wheel I, which co-operates with the disc J on the shaft D to prevent any rotation of the shaft E except at such times as the shaft D is in a definite position. The shaft E also extends slightly beyond the standard B, and on the outside has a change wheel K connected to it. The shaft F within the standards is screw-threaded and, projecting outside the standard B, carries a change wheel L gearing with the change wheel K. A shaft M is provided in line with the shaft F having mounted on it a gear wheel N, which can be connected by a worm wheel O to the meter mechanism. This shaft is supported in a bearing P at one end and at the other end the bearing is constituted by the end of the screwed shaft F. It carries a pin which can slide in a slotted sleeve screwed at one end to act as a nut to the shaft F.

In operation, as a coin is inserted and the hand wheel turned so the coin moves the wheel I, and thus, by way of the change gear and the screwed shaft, causes the sleeve to travel longitudinally. It is the practice to utilize this motion to indicate the number of coins that have been inserted or the amount of gas paid for but not used. The patentees, however, prefer to effect this by means of a horizontal rotatable drum R mounted on the standard B; a fixed pointer S being disposed adjacent to it. On the periphery of the drum figures corresponding to coins or to quantities of gas are marked, and the drum is rotated as the sleeve is reciprocated by means of a crank connecting the drum with a saddle engaging a groove in the sleeve; the saddle being preferably guided by a bar fixed in the standards A and B and extending to carry the bearing P for the shaft M referred to above. An additional guide-piece passes over the extension of the shaft and through the adjacent standard A.



W. H. Cowan's (Parkinson and Cowan) Prepayment Gas-Meter Mechanism.

The arrangement described can, as an entity, be applied to a meter entirely outside the meter case (figs. 5 and 6)—for instance, in a chamber disposed above the coin box T and arranged at the side of the meter; the disposition being such that the operating handle D is in the front of the meter and the coin slot U at the side. Also the valve box (not shown) may be placed in this chamber with the prepayment mechanism or may be used inside the meter casing. The casing containing the prepayment mechanism preferably has a window V in the front, so that the indication of the drum R can be seen.

Devices for locking the Geneva stop for preventing withdrawal of a coin after it has been inserted, means for closing the coin slot when the full number of coins have been prepaid, and any other devices usually employed can be provided as desired.

Gas-Meters.

HIBBERD, C. E., and GOAD, F. L., of Edinburgh.

No. 12,006; May 15, 1914.

This invention relates to dry gas-meters of the type in which the casing is divided into upper and lower chambers by a horizontal partition; the lower chambers being further subdivided by a vertical partition extending from the bottom of the meter casing to the horizontal partition. The object aimed at is "to effect improvements as regards the compactness of the meter as a whole, so as to simplify and cheapen its manufacture, and in some cases to reduce the amount of material required."

To this end the invention consists "in a gas-meter having a vertical partition separating the measuring chambers; the arrangement being

such that the meter casing or the vertical partition are bent to form the whole or part of the inlet and outlet ducts."

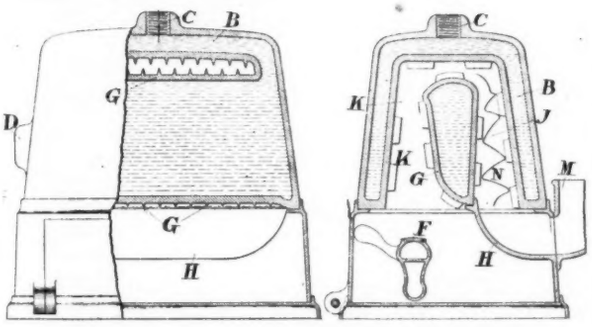
The invention is said to be especially applicable to dry meters of the type in which the gas has access to the casing, and the diaphragms either oscillate about their central positions of support or in their extreme positions assume a substantially cylindrical form. In particular, the invention may be applied to meters like those described in patents No. 25,381 of 1913 and No. 4186 of 1914.

Water-Heaters.

BARRALET, T. E., and the PARKINSON STOVE COMPANY, LIMITED, of Birmingham.

No. 13,093; May 28, 1914.

This invention relates to water-heaters of the type consisting of a hollow shell, having double walls forming a water-chamber the interior of which is crossed by a transverse chamber communicating at its opposite ends with the water-chamber. The bottom of the transverse chamber is closed instead of being connected to the outer chamber, and (preferably) extends to the level of the bottom of the outer chamber; and a partition separates the burner chamber from the down flue and outlet upon the one side of the transverse chamber. With this arrangement greater travel of the gases is said to be obtained with correspondingly greater efficiency.



Barralet's (Parkinson Stove Company) Water-Heater.

A longitudinal section through the water-heater and a vertical transverse section are given.

The heater consists of a hollow dome-like shell having double walls, forming a water-chamber B between them; C being the outlet and D the inlet. The shell is mounted upon a hollow base containing the burners F; and its inner wall is cast integral with a transverse chamber G crossing the interior of the shell and communicating at opposite ends with the external water-chamber. This transverse chamber at the top is separated from the dome of the shell by a space through which the gases pass; while its lower end engages with a ledge at the upper end of a partition H separating the burner chamber from the down flue J. Thus the gases ascend through the flue K on one side of the chamber G, pass over the top of the latter, and descend the flue J on the other side of the chamber—thus passing to the outlet M. The down flue preferably contains a corrugated or zig-zag baffle-plate N, "to ensure the better absorption of the heat by the walls of the water-chambers." The inner walls of the shell and the outer walls of the chamber G may have webs or projections for more readily absorbing the heat.

Discharging Devices for Vertical Retorts.

PLANTINGA, P., of Cleveland, Ohio, U.S.A.

No. 18,390; Aug. 7, 1914.

This invention relates to vertical retort discharging devices of the kind in which the coke from the lower end of the retort falls on to a downwardly inclined surface in a casing that is also provided with a moving discharging member for ensuring the proper passage of the coke to the lower end of the casing, and means for agitating the coke to prevent it clogging.

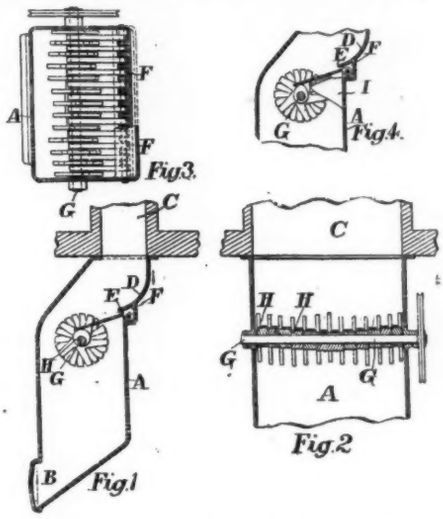
Fig. 1 is a vertical transverse section of the lower end of a retort with the discharging device attached to it. Fig. 2 is a longitudinal fragmentary section of the parts shown in fig. 1. Fig. 3 is a horizontal section of the discharging device taken on the line X of fig. 1. Fig. 4 represents a fragmentary transverse section of a modified form of the device.

The gas-tight casing A has an inclined bottom terminating at an opening B provided with a closing lid, through which the coke from the retort, on being discharged, may be removed. The upper end of the casing is provided with an opening which registers with the lower end of the retort chamber C. Formed in the rear of the casing and below the opening is a downwardly and inwardly inclined surface D, the lower end of which projects inwardly a short distance beyond the rear wall of the casing as at E. Immediately below the lower end of D is a series of aligned recesses F through the walls of which passes a rod, the extremities of which are supported in the end walls of the casing. In suitable bearings, formed integrally with the end walls, is a shaft G having its axis in a plane somewhat below the extremity of the inclined surface D. Mounted on the shaft, and rotatably secured to it, is a plurality of hubs H, each of which is provided with radially extending blades arranged helically with reference to each other in the longitudinal direction of the shaft. As illustrated, there is an odd number of sets of blades; and the middle three sets may be conveniently mounted on a single hub. Each of the other hubs is formed with a circular cam formed upon the middle hub. All the hubs on the right-hand side of the middle set of blades are timed to reach their highest points successively, and those on the left-hand side are similarly timed.

The number of recesses F corresponds with the number of the spaces between adjacent sets of arms; and these recesses are in transverse alignment with the spaces. In each recess is an agitator-arm, the inner and free end of which extends into the aligned space between the corresponding adjacent sets of blades and rests upon the corresponding cam, as shown.

One end of the shaft G is provided with a driving pulley by means of which the shaft, cams, and arms may be rotated to effect the non-synchronous oscillation of the agitator-arms which are on one side of the middle set of blades and a similar non-synchronous oscillation of the blades on the other side of the set.

The coke coming from the bottom of the retort falls upon the inclined surface D and down upon the agitator-arms and against the discharging or extracting blades; and as the arms revolve, they catch and carry the coke forward and discharge it into the bottom of the casing. The oscillation of the arms prevents the mass of coke from binding and facilitates its downward travel toward the discharging arms. By timing the circular cams differently (as described), the power necessary to effect the oscillation is distributed throughout one complete revolution of the shaft, and "thereby produces a more satisfactory operation."



Plantinga's Discharging Device for Vertical Retorts.

By employing the circular cams shown, the oscillation of the agitating arms is of a continuous and even nature. But it may be desirable in some cases to effect the oscillation in an intermittent manner and cause each one of the arms to rise quickly and drop quickly and then keep in a condition of rest throughout the remainder of the shaft's revolution. Where such action is desired, the shape of the cam may be varied to effect a quick rise and fall, as in fig. 4, and a shelf or stop I may be formed on, or secured to, the rear wall and under each of the agitator-arms. The height of each shelf is made so as to support the corresponding arm throughout a portion of the revolution of the cam and permit it to remain at rest for a fixed period of time.

Measuring or Regulating the Temperature or Differences of Temperature of Liquids.

SIMMANCE, J. F., of Westminster Palace Gardens, S.W.

No. 23,564; Dec. 4, 1914.

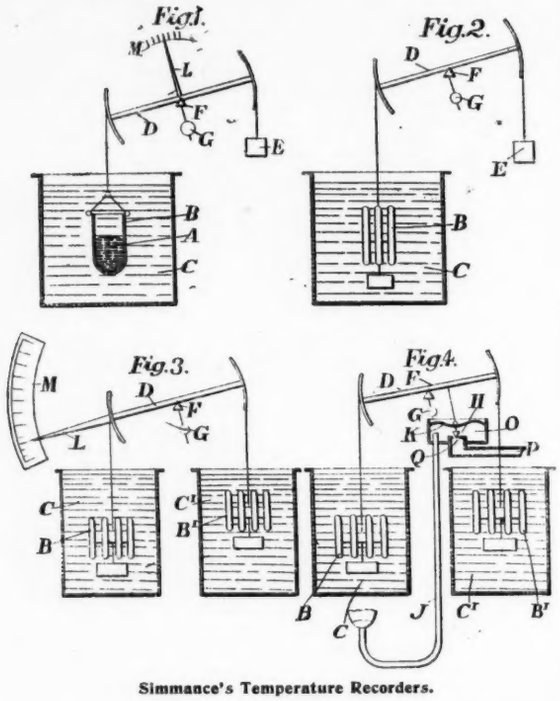
In most apparatus for indicating or recording the temperatures of substances as at present constructed, the patentee observes, the scale on which the indication or record is read off is a comparatively small or close one; and it is not therefore easy to read off indications for small variations of temperature, or to read the indications at all at any distance from the scale. The present invention is designed to provide means for obtaining indications of the temperature or the temperature differences of liquids upon a very open scale, and at the same time to provide means, where required, for the (at any rate) approximate regulation of such temperatures or temperature differences. The invention also provides means whereby the indications of temperature or temperature difference may be adjusted or be made to coincide with the graduations of a previously and independently prepared scale of any suitable or desired size.

Figs. 1 and 2 [p. 654] show two forms of the device used as a thermometer. Fig. 3 shows apparatus for indicating the difference in temperature between two bodies of fluid. Fig. 4 shows apparatus for automatically regulating the temperature difference between two bodies of liquid.

In fig. 1 C is the body of liquid the temperature of which is to be measured. A is the expansible or contractible material, which may (for instance) be mercury, which is submerged in the open vessel B in the liquid C, so that the liquid can freely enter B, which is suspended from one end of a balance-arm D, from the other end of which is hung a weight E adapted to balance the vessel B and medium A as suspended in the liquid C. The arm D is supported on the fulcrum F and is provided at its ends with sectors over which the cord or wire suspending the vessel B and weight E are passed, so that the effective effort exerted by them about the fulcrum F is maintained constant for varying positions of the arm. Attached to D (preferably at its centre

or coincident with its point of suspension on the fulcrum F) is a pendulum having a weight G, preferably adjustable, on it. The arm D may also carry a pointer L, the extremity of which is adapted to sweep over a scale M graduated to indicate the temperature of the liquid.

In operation, as the temperature of the liquid C rises or falls the temperature of the medium A correspondingly varies, causing an expansion or contraction different in degree from that of the liquid C. The result is to cause the receptacle B and the liquid A to rise or fall in the liquid C owing to its change of density. Once set in motion, it would, if simply counterposed, according to circumstances rise to the top or sink to the bottom of the liquid C; but, owing to the varying effect of the pendulum weight G as the arm D swings, the rising and falling movements of the vessel B and medium A are limited in relation to the variations of temperature. By varying the weight G or its position on the pendulum, the amount of movement for a given variation of temperature may be regulated.



Simmance's Temperature Recorders.

In fig. 2 is shown similar apparatus, with the exception that, instead of a fluid A like mercury in an open vessel B being employed as the expansion and contraction medium, a gas enclosed in one or more hermetically sealed flexible envelopes B is used for the purpose. As such a device would normally float on the surface of the liquid A, a weight of suitable dimensions is attached to it, to submerge it in the liquid.

In fig. 3 the apparatus is shown as employed for indicating the temperature difference between two bodies of liquid. The apparatus is similar to figs. 1 and 2 except that, instead of the counterpoise weight E, a second expansion and contraction body B^1 is suspended from the balance arm D and is submerged in the second body of liquid C^1, the temperature difference between which and the first body of liquid C is to be indicated or recorded. As shown, the expansion and contraction body B consists of gas in a flexible envelope; but the arrangement shown in fig. 1 may also be employed.

In fig. 4 the employment of the apparatus as a thermostat is illustrated. The arrangement here is adapted to regulate the temperature difference between two liquids one of which is heated by a gas-flame. Generally the apparatus is similar to that shown in fig. 3, and an indicating finger and scale may, of course, be mounted on the balance arm. The gas passes through a valve box O, one side of which consists of a flexible diaphragm K. Gas is led to the box through the pipe P and fed to the heating jet by the pipe J. At the inlet of the pipe P into the box O is arranged a valve seating Q; and depending from the flexible wall K is a valve H adapted, in conjunction with the seating Q, to regulate the flow of gas. The balance-arm D is connected by a link with the flexible wall K of the valve box O, so that any variations in the temperature difference, causing the arm D to swing, correspondingly operates the valve H to increase or decrease the flow of gas.

A CORRECTION.—Readers will have noted that, in last week's issue of the "JOURNAL," there was an accidental transposition of the illustrations in two of the patent specifications. Those appearing on p. 588 as Shewring's milk-of-lime agitating device should have been included in the specification abstracted on p. 587 of Grundy's distance gas-lamp lighter, and *vice versâ*.

European Gas Company.—The profits of this Company for the financial year to March 31 are reported as insufficient to allow of the distribution of the usual dividend; but the Directors have decided, subject to audit, to recommend that the difference necessary to make up such dividend be taken from the reserve of undivided profits, and that a dividend of 10s. per share, the same as last year, be paid, free of income-tax, on July 31.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill reported, with amendments: Plymouth Corporation.
Bills committed: Ammanford District Council, Skegness Gas.
Bill referred to the Examiners: Kilmarnock Gas.
Bills read a second time and committed: Barnoldswick Water, Chelmsford Gas, Dewsbury Corporation, Metropolitan Water Board, Southend Water, Rhondda District Council.
Bill read the third time and passed: Forfar Gas.
Bills Royal Assented: Frimley and Farnborough Water, Doncaster Corporation, Bury and District Joint Water Board.

The following Bills have been referred to a Select Committee, consisting of Lord Ribblesdale (Chairman), the Earl of Doncaster, Lord Digby, and Lord Colchester, to meet next Monday: Barnoldswick Water, Dewsbury Corporation, Metropolitan Water Board, Rhondda District Council.

A Committee is to meet to-day to consider the Ammanford District Council, Skegness Gas, and Southend Water Bills.

The Earby Water Company have presented a petition against the Barnoldswick Water Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill reported, with amendments: Gas and Water Provisional Orders (No. 2).
Bill read the third time and passed: Brighton and Hove Gas.

The Spennymoor and Tudhoe Gas [Lords] and the Altrincham Gas Bills have been referred to a Committee, consisting of the Chairman of Ways and Means, the Deputy-Chairman, Sir William Beale, Mr. Mooney, and Mr. Moon; to meet next Thursday.

Coal Prices.

In the House of Commons last Tuesday,

Mr. ROWLANDS asked the President of the Board of Trade whether he was aware of the continued high price of coal, which is advertised by the London coal merchants as at the "lowest summer prices;" whether he has arrived at a satisfactory understanding with the merchants with regard to the limit of their profit; whether he is in consultation with the coalowners, and has any understanding been arrived at with them; and, if not, whether it is the intention of the Government to take action to secure a lower price at the pit's mouth.

Mr. RUNCIMAN: As has already been announced, I have arrived at an understanding with the principal London coal merchants for a limitation of profits during the summer, and, I hope, the winter months also. I have been for some time in communication with representatives of the coalowners supplying London, with a similar object in view. They have made a proposal which I cannot at present regard as satisfactory; and I am not yet in a position to announce a definite arrangement.

Mr. JONATHAN SAMUEL: Is my right hon. friend aware that in the North of England the price of coal to household consumers in the last few weeks has been raised as much as 7s. 6d. at one time; and does he propose to take action to prevent this?

Mr. OUTHWAITE: Is the right hon. gentleman aware that in the Potteries there has just been an increase of 2s. 6d. a ton on coal?

Mr. ROWLANDS: Is the right hon. gentleman aware of the action of some of the merchants, and that the price will continue to rise in the summer right into the winter?

Mr. RUNCIMAN: In answer to the last supplementary question, my information is that the price is not likely to rise this winter, so far as those with whom I have been in negotiation are concerned. I do not wish to make any arrangement with them to start off at too high a level. The various questions put are more or less new to me; and I cannot answer them without notice.

Sir A. MARKHAM: Will the right hon. gentleman adopt my proposal and fix a limit at the pit head based on the prices of last year?

Mr. RUNCIMAN: Yes. I am not at all anxious to withdraw from my hon. friend the credit of that proposal. It is exactly the basis on which I have been negotiating with the Midland coalowners.

Trinitrotoluol.

Sir R. COOPER asked the Financial Secretary to the War Office last Tuesday if his attention had been drawn to the offer made within the last fortnight to the High Explosive Commission of a large quantity of trinitrotoluol; if the Commission expressed their desire to secure all supplies available at the fixed price of $1, but refused to pay any higher price; if France and Russia are taking all they can obtain of this product at a price of $1.35; and, if so, by what means does he hope to obtain the supplies so urgently needed at present by the British Government?

Mr. FORSTER: A great many offers of trinitrotoluol are constantly being received; and it is impossible to identify the particular offer referred to. The arrangements made for the production of the explosive are such as to secure an ample supply for our own use; and we are also able to assist our Allies. With regard to the question of price, I do not think it desirable to give the exact figure at which we are able to purchase; but it is substantially below that quoted in the question.

Glasgow Coal Contract Prices.

Mr. ANDERSON asked the President of the Local Government Board last Wednesday whether he was aware that the Glasgow Corporation, in their new coal contract, had been obliged to pay increased prices of from 60 to 70 per cent.; whether he would obtain information as to

the prices at which the municipal authorities had renewed their coal contracts for this year; and whether, in view of the position being created for some of the vital municipal and industrial enterprises, he would endeavour to get enforced the main recommendations of the Departmental Committee on Retail Coal Prices.

Mr. RUNCIMAN: I have been requested to answer this question. As I have stated at various times in the House, effect has already been given to the majority of the recommendations of the Departmental Committee; and, as I recently stated, I am in negotiation with colliery owners with reference to the pit-head prices of coal. I will consider the suggestion that information should be obtained with reference to the contract prices for coal paid by municipal authorities.

PARLIAMENT AND COAL SUPPLIES.

Notes from a Debate.

In view of the references elsewhere in this issue to the conference between representatives of the gas and electrical industries and members of Parliament last Wednesday, some extracts bearing on the question of coal supplies from the discussion in the House on Thursday will be of interest. The discussion arose on the increased cost of commodities under war conditions.

Sir H. DALZIEL, who was the first speaker, said that one question which affected the increased cost of living was the price of coal. His own view was that this matter of coal should have been dealt with in a much more drastic and effective fashion at the beginning of the war. The export of coal should have been stopped right away, except to Allies abroad and those who were in sympathy with this country. There was considerable feeling in the country that the Government had had too much regard for vested interests in this matter of the price of coal, and that they ought to take up the question much more radically than had been done. He would not go so far as to say they ought to take the whole control; but certainly they should go a considerable way in this direction.

Mr. LOUGH remarked that part of the rise, at all events, was accounted for by the advance made by the colliery owners. He thought this was a little unreasonable, and that pressure ought to be brought to bear upon them in accordance with the recommendations of the Board of Trade Committee. He would urge the necessity of doing everything possible to effect a change in the price. In the autumn and winter there would be great trouble in London, if something bold was not done to establish a reasonable price.

Mr. ROWLANDS, as a member of the Board of Trade Coal Committee, said he was very glad the subject had come up for consideration in the House. He desired to point out particularly one effect on the community of the high price of coal which did not at first strike those who had not gone into the question thoroughly. With the rise in price, the large consumers, like the gas companies and various electric supply and municipal and other undertakings, had to pay the increase. With regard to gas companies, every shilling on a ton of coal, he believed, meant a rise in the price of gas of 1d. per 1000 cubic feet. This might seem a small thing; but some years ago he had occasion to engage in a very long controversy with the principal Gas Company in London, and at that time he had to go into the matter very thoroughly. A penny per 1000 cubic feet in the case of the Gas Light and Coke Company meant a difference of £110,000, and in the case of the South Metropolitan Company of about £50,000. He could not at the moment say what the increase amounted to in the case of the Commercial Gas Company; but, roughly speaking, 1d. per 1000 cubic feet meant, with these three Companies, a difference to the consumer of £200,000. If this was multiplied by 2d., 3d., or 4d., as the case might be, they would realize at once the enormous sums of money with which they were dealing. Large institutions which used gas a good deal for cooking purposes were very heavily mulcted by the increased price. The people who used the prepayment system did not pay on extra thousands; but they had a smaller number of cubic feet supplied to them. These people consumed gas, not only for lighting, but also for cooking purposes. The penalty that had been imposed on the people by the increased prices was almost incalculable. It might be said that he was confining himself to the case of London. This was quite true, because it was the greater case. But the argument applied just as strongly to other large towns, where they had also had to pay these enormously increased prices. The Committee went very carefully into the necessity of the increase of price, but failed to find that there was any reason why the price should have gone up as rapidly as it did. They knew that the boats were taken by the Government. Some of the large undertakings, such as gas companies and the electric supply companies, were almost out of coal; and had they not been supplied, there would have been no light. This would have meant that munition works would have been unable to go on. To a large extent this arose because the supply of coal which was sea-borne was reduced by about one-half. The question of coal prices must be dealt with by the Board of Trade in a very drastic manner. Had his right hon. friend been upstairs in the Committee Room on the previous day, when every section of the House was represented, and seen the feeling exhibited by the gathering of representative men from the municipalities and big utility societies, he would have known that he was face to face with a problem which, in the interests of the community, must be grappled with at once. If he took up this attitude—and he had the courage to do so, if he made up his mind to it—he would find in his negotiations that the coalowners would become much more pliant. They did not ask him to nationalize the coal mines. This was not the sort of question to be discussed in the midst of present difficulties. Anyone who was in the Committee Room the previous day, and heard what was said there, would have come away with the idea that an adequate coal supply was really in jeopardy. He hoped that, when the President of the Board of Trade came to reply, he would be able to give some assurances in this respect. The statements that were made, he thought, impressed most seriously the members who heard them. Representatives of the large gas companies stated that at this time of the year they were accustomed to put into stock, for their winter requirements—one said 50,000 or 60,000 tons a month. To-day they found it quite impossible to do much more than keep their ordinary requirements going. It came home to everyone that the maintenance of the supply of coal for the large industrial centres was in jeopardy. Unless this question was very carefully watched by the Board of Trade, he feared that the whole industry of the country might be greatly injured, and that the new Minister of Munitions might find that he was up-against one other problem which was of a most serious character.

Mr. RUNCIMAN (the President of the Board of Trade) admitted that there had been no commodity the general rise in price of which had given more anxiety to the country than that of coal. He had not the privilege of knowing what was stated by the representatives of the local authorities and the gas companies the previous day; but if, as had just been suggested, they stated they were not able to make up the accumulation of stocks which was necessary during the summer months, he could only say this was not the general experience. The figures which had been accumulated in the Department showed that steps were being taken, and successfully taken, though at greatly enhanced prices, to increase the amount of stocks which were usually accumlated in the summer for consumption during the winter months. This was a slight improvement in the right direction; and they hoped it might proceed rapidly during the next two or three months.

Sir W. PEARCE: The statement referred to was made by the representative of the Gaslight and Coke Company, who said that they were entirely unable to make up the large stocks which they had been accustomed to do up to the present time.

Mr. RUNCIMAN: I have not had the opportunity of refreshing my memory on the state of the stocks of the Gas Light and Coke Company. But the figures are known to us; and the great London Gas Companies, and the local authorities who make gas and electric light for the people of London, have been able to make some progress to overtake the depletion which takes place in the winter months.

Mr. EDGAR JONES: It is a special kind of coal.

Mr. RUNCIMAN: It is entirely due to that fact. I am not now speaking of coal as a whole, but of coal for gas, which was the immediate subject dealt with yesterday. If we take London, we get the coal problem in its most acute form. Continuing, he said that when they took the whole of the interned German vessels, and put them into the London coal trade, they did it with the deliberate object of helping the coal supply of the Metropolis. It had been urged that they ought to have let all these vessels at the rate of freight equivalent to the rate which was paid by the Admiralty for the commandeered colliers; but if they had done this, it was quite clear they would have been giving certain coal consumers—the great companies, as well as local authorities—advantages which were obviously being withheld from others. The vessels were by no means able to supply the whole coal requirements here; and even the allocation of them was a matter of great difficulty, in order to avoid giving favours to some companies and withholding them from others. There was only one fair thing to do in the circumstances, and that was to take the market rate as being a fair indication of the price that ought to be paid—such profits as were made by these vessels going to the community as a whole. He hoped they had been managed with skill, and believed they had been, by the business men in the North country who undertook the duty. They did so, not on a basis of commission, or so much per cent. on the earnings of profits, but on a lump sum commission based on the returns. Long after this had been earned, they went on with their work just as enthusiastically and as zealously as though they were being paid the full percentage on every ton of coal carried. He was afraid he could not give any definite information as to the exact amount of the profits, which went into the Exchequer; but he hoped before the whole transaction was over they would have far more than paid for the whole upkeep of the vessels, the repair of them, and the restoring of them, if necessary, in much their original condition, If there was an exchange of tonnage with Germany and Austria when the war was over, there would be a profit of (say) £2000 on this transaction. If they had run them on the same rates as were being paid to the owners of the requisitioned boats running for the Admiralty they would have made a definite loss. In reply to a question as to how much per ton of coal the increase of wages involved, Mr. Runciman remarked that if he were a coalowner he should say 1s. 6d. a ton; but he could not agree with this estimate, which had been put to him by many coalowners, who were bound to be on the safe side from their point of view. What it would actually amount to on the whole output, he could not say at the present moment; but there was no doubt that 1s. 6d. was a gross exaggeration. It was much nearer pence than shillings. When all was said and done, the present pit-head price of coal was far in excess of what the expense justified. The coalowners were engaged in a highly speculative industry. There were some years when they made fairly large profits, some years when they made none, and some when they made losses. But they were not justified in looking upon this as one of the normal good years. Their getting high prices for coal depended, not on a trade boom at all, but on a state of war. It was in pressing this point that he had almost reached an agreement with the Midland coalowners, who were mainly concerned with the supply of the coal which was the subject of anxiety to gas and other companies. He hoped to be able to announce shortly that they had come a little nearer to expectations—he might say a little nearer to the Government's demands, because it must be perfectly obvious that, if they were not fairly met by agreement, Parliament would not tolerate any exploitation. He still hoped they might be able to come to an agreement. When this had been reached, there would be found some means of checking those violent fluctuations which were so disturbing, not only to householders, but also to those engaged in industry.

Sir C. CORY said that a member of the Labour party had referred to the enormously increased price the gas companies were asked to pay for coal supplies. It was stated by Lord Joicey at the deputation of coalowners to the President of the Board of Trade that the gas companies were deserving of no commiseration whatever. South Wales did not supply gas companies, so this question did not affect them; but so far as other districts were concerned, it was stated that the gas companies made contracts for some 300,000 or 400,000 tons, before the war broke out,

with German coalowners, with the object of reducing the price of the English coalowners. When the war broke out, they could not get delivery; and they then came to the English coalowners, and were able to obtain their supplies a little below the prices which existed before the war. But in their wisdom they thought the probabilities were that the war would be over soon, and they could get supplies at very much less cost. So they neglected to make contracts until prices went up very much higher; and then they came along, and the coalowners had sold practically the whole of their stocks, and had no coal to sell. First they elected not to buy, and then they whined and complained because they could not buy except at a high price. It might be very hard on the gas consumer; and he had a right to complain of the gas producer for his bad judgment.

Mr. Outhwaite said he had in his hand a letter sent by a colliery proprietor at Stoke-on-Trent (who was one of the local combine) to a manufacturer. In this intimation was given of an advance of 4s. per ton in the price of all qualities and sizes of manufacturing fuel, as from May 26. That was to say, when the recent increase in the wages of miners' took place, instead of putting on what the President of the Board of Trade had described as an extravagant increase of 1s. 6d. per ton, the colliery proprietors in this district had put up the price of coal to the still more extravagant figure of 4s. per ton increase. The manufacturer to whom this intimation had been addressed wrote him; "The North Wales colliery proprietors are paying exactly the same advance as under the award made by Lord Coleridge; and the North Wales coalowners are content with an advance of 2s. 6d. on coal and 1s. 8d. on slack. Observe the great difference between 1s. 8d. and 4s., which latter the Staffordshire potter must endure for the production of his ware; and this in addition to prices already extravagant for what is, literally, dust." Manufacturers in the Potteries had continued production rather than discharge hands; and it was grossly unfair that the colliery proprietors should be allowed to make these extravagant charges, and so hinder industry.

GUILDFORD AND MELTON MOWBRAY GAS ORDERS.

The Board of Trade report, in accordance with section 4 of the Gas and Water Works Facilities Act, 1870, that, in making the following Provisional Orders, they have dispensed with the consent of certain local and road authorities.

Guildford Gas Order.

The application for the Provisional Order was made by the Guildford Gaslight and Coke Company, who sought power to extend their limits of supply and to raise additional capital. The extended limits of supply proposed to be authorized by the Order included the parishes of Albury, Artington, East Clandon, Shere, and West Clandon, in the rural district of Guildford, and the parishes of Hascombe, St. Martha, and Wonersh, in the rural district of Hambledon, in Surrey. The promoters failed to obtain the consent to the application of the Surrey County Council, the Guildford Rural District Council, the Hascombe Parish Council, and the Shere Parish Council; and they asked the Board to exercise their powers and dispense with these consents. The Board accordingly held an inquiry into the matter at their office, at which the dissenting authorities, with the exception of the Hascombe Parish Council, were represented.

At the inquiry, the representative of the Surrey County Council stated that the Council had been unable to agree with the promoters for the insertion in the proposed Order of a clause for the protection of the Council, that he understood that the Board of Trade would not insert a protective clause in the Order unless it was agreed to by the parties concerned, and that, in these circumstances, the Council preferred to put their case before a Parliamentary Committee. The Board, accordingly, decided to dispense with the consent of the Surrey County Council to the application.

It was stated on behalf of the Guildford Rural District Council that they had agreed with the promoters for the insertion of a clause for their protection, but that they desired a further clause to provide that the Council should reinstate the surface of roads broken-up by the Company for the purpose of laying mains, and should charge the cost of such reinstatement to the Company. The Council contended that such an arrangement would be for the benefit both of the Company and the Council, as the surface of the roads would be repaired at less cost by the Council (who have a staff accustomed to such repairs) than by the Company. The promoters expressed themselves unable to agree to this arrangement, on the ground that they would have no check on the expenditure incurred by the Council on their behalf. A representative of the Shere Parish Council said that his Council would be satisfied if the agreed clause for the protection of the Rural District Council were inserted in the Order. The promoters stated, however, that this clause had only been agreed to by them as a complete settlement of the requirements of the Rural District Council, and that, as the Rural District Council desired a further clause which the promoters could not concede, the latter were not prepared to insert the agreed clause. After consideration, the Board decided to allow the Order to proceed without the clauses desired by the Rural District Council, and to dispense with the consent of that Council and of the Shere Parish Council. The Rural District Council and the promoters have since agreed to a clause for the protection of the Council; and the Board propose to submit an amendment accordingly.

A letter received by the Board from the Hascombe Parish Council and read at the inquiry stated (1) that there was no demand for a supply of gas in the parish, and (2) that it was desirable that Hascombe Proper should be supplied by the Godalming Company or by the Cranleigh Company, and that Hascombe Detached should be supplied by the Cranleigh Company, and not by the Guildford Company. The promoters stated that, in accordance with an arrangement come to with the Cranleigh Gas and Coke Company, Hascombe Detached and parts of the parishes of Albury and Wonersh would remain within the limits of the Cranleigh Company; and in view of this fact, the Board decided to dispense with the consent of the Hascombe Parish Council.

Melton Mowbray Gas Order.

The application for the Provisional Order was made by the Melton Mowbray Gas Light and Coke Company, Limited, who sought power to extend their limits of supply and to raise additional capital. The extended limits of supply proposed to be authorized by the Order comprised twenty parishes in the county of Leicester; and the promoters obtained the consent to the application of all the local and road authorities concerned with the exception of the Holwell Parish Council and the Wartnaby Parish meeting. The promoters requested the Board to exercise their powers and dispense with the consent.

The Board accordingly held an inquiry into the matter at their office, to which, however, neither of the two local authorities sent representatives, though they were invited to do so. The promoters stated that, though the parishes of Holwell and Wartnaby were at the extreme north-west of the proposed extended limits of supply and were thinly populated, the Company desired to include them within their limits, in order to complete the circuit of their mains supplying other parishes, and so to avoid a dead-end of main. The parishes were conveniently situated for a supply of gas from Melton Mowbray; and there was no other gas undertaking in the neighbourhood which could give a supply therein. In these circumstances, the Board decided to dispense with the consent of the two local authorities to the application.

LEGAL INTELLIGENCE.

INCANDESCENT GAS-MANTLE LITIGATION.

The action of the "United Chemical Works, Limited *v.* Sadur," which was tried before Mr. Justice Darling and a Special Jury on Friday last, was brought to recover £61 9s. 6d., the price of a large quantity of "Guarantee" mantles and of 100 gross of "Seconds."

Defendant, who is a wholesale grocer of Watney Street, Stepney, admitted purchasing the mantles, but said plaintiffs were not entitled to claim the money as they were agents for German principals. By counterclaim, defendant sought to recover £111 1s. 6d. as damages for breach of contract, as owing to the outbreak of the war plaintiffs were unable to fulfil his order, and he had to purchase mantles elsewhere.

Mr. Harris, the Manager of the Company, said that all the Directors were resident in Germany, and that since the war broke out the business had been closed-down. It was the practice to send on all orders to Berlin, and the goods were forwarded direct from there to customers. No mantles had been received from Germany since August. Witness obtained mantles from Holland on his own account to fulfil defendant's order; but they were quite different to "Guarantee" mantles.

His Lordship ruled, in accordance with a recent decision of the Appeal Court, that the plaintiffs were not a German Company but an English Company, and as such entitled to maintain the action. He therefore directed the Jury to find for the plaintiffs for the amount of the claim, as there was no dispute that the money was due.

On the counterclaim, the Jury found for the defendant for £73 17s. 6d., and added the following rider to their verdict: "We think that attention should be drawn to the fact that although, by his Lordship's ruling, the plaintiff Company is an English Limited Liability Company, yet it is a peculiar fact that the books are not kept at the registered office of the Company, but in Germany."

Action over a Gas-Plant Warranty.

The action in the King's Bench Division of the High Court of Justice, before Mr. Justice Atkin, in which Messrs Cory Bros. and Co., Limited, of Cardiff and Swansea, sued Messrs. Mather and Platt, Limited, manufacturing engineers, of Manchester, was settled last Wednesday, upon terms which were not disclosed. The claim was for damages for alleged breach of warranty in connection with a producer-gas plant supplied to the plaintiffs' collieries at Aber, near Pontypridd. The earlier stages in the proceedings [which at the time of the settlement had occupied many days] were noticed in the "Journal" last month, pp. 412, 463.

Fraudulent Abstraction of Gas.

At the Manchester City Police Court, last Tuesday, before the Stipendiary Magistrate (Mr. E. Brierley), the Manchester Corporation prosecuted William Daulby, who described himself as an electrician, for various offences committed by him contrary to the Gas-Works Clauses Act, 1871. There were three charges against the prisoner. The first was larceny at common law, with stealing 100 cubic feet of gas, valued at 3d. The second charge was with fraudulently abstracting and using or consuming the gas; and the third charge was with unlawfully disconnecting the service-pipe from the prepayment meter supplied to him by the Corporation. The prisoner, it was stated, rented a cellar, and used it as an electrician's fitting shop. He had a prepayment gas-meter supply; and the last clearance was on May 14, since which date no money had been deposited in the box. On June 3, two prepayment collectors called, and a gas-fire was seen to be burning. As soon as the prisoner saw the inspectors, he rushed to the meter. Both the inlet and outlet unions were uncoupled. When the accused got to the meter, the gas-fire went out. Prisoner declared that he had been trying to locate a leakage by blowing smoke into the meter. He was doing this when a customer called him away hurriedly to repair a motor. He left the meter uncoupled. It was untrue to say that the gas-fire was burning on June 3 or any other date about that period. The Stipendiary said it was a pity the inspectors did not examine the top of the fire to see whether it was warm. He fined the prisoner 40s. for fraudulently abstracting gas. The other two charges were withdrawn.

MISCELLANEOUS NEWS.

THE COAL-TAR DYE INDUSTRY IN AMERICA.

Proposed Enlargement for the United States.

In a recent number of the "Journal of Industrial and Engineering Chemistry" [Vol. VI., No. 22] the recommendations are published, *in extenso*, of the New York Section of the American Chemical Society on the enlargement of the coal-tar chemical industry in the United States.

The Committee, which was appointed "to investigate and report upon the conditions and needs involved in the enlargement of the coal-tar dye industry in the United States," was composed of the following members: J. B. F. Herreshoff, representing the manufacturers of heavy chemicals; I. F. Stone, representing the American coal-tar dye producers; J. Merritt Matthews, representing the textile interests; H. A. Metz, representing the importers; David W. Jayne, representing the producers of crude coal-tar products; Allen Rogers, Chairman of the New York Section; and Bernhard C. Hesse, chemical expert in coal-tar dyes, Chairman. The findings of the Committee were considered in detail; and, after discussion, the report was unanimously adopted by the Section and ordered to be printed in the pages of our American contemporary named above.

From the official text of the report we make the following extracts.

Your Committee has carefully considered all public suggestions as to methods of improvement, and has searched through the governmental regulations of the belligerent nations as to embargo, and as to contraband of war, in order to construct therefrom a list of chemicals, inclusive of dyestuffs, which have thereby been shut-off from the United States, in the hope of thus being placed in a position to make specific recommendations of value.

It can be fairly stated that, in general, the chemical industry of this country is efficiently exploited, and is making full use of all the opportunities presented to it under the normal conditions existing prior to the state of hostilities. Some of the chemicals which are imported from abroad are made in considerable amounts in this country as well, and the amounts imported under normal conditions depend upon the ordinary normal fluctuations of business conditions both here and abroad. With the stoppage of this foreign supply, the domestic production was not at once capable of making up the deficiency; but in a number of instances the American manufacturers have taken steps to increase their capacity, and the strain in the market of these particular things will exist no longer than it will require to expand the manufacturing facilities to the proper extent.

Among these are: Ammonia salts, barium chloride, barium nitrate, bleaching powder, sodium cyanide, yellow prussiate, sodium nitrate, sodium hydrosulphite, zinc dust.

If, however, it be desired, and if public necessity requires the introduction of the manufacture of explosives and further chemicals and dye-stuffs into our home industry—such as coal-tar product explosives, pharmaceuticals, medicinals and other intermediates, and finished coal-tar dyes—then alterations of our tariff law are inevitable; and the consumers in the first place and the public in general must share in the burden thus imposed. If conditions of national defence in case of attack by a foreign Power require us to manufacture our own explosives and to be, in this regard, independent of all foreign nations at all times, or if our textile industries or any other of our industries requiring coal-tar chemicals such as dyestuffs shall for ever be protected and made independent of foreign nations for the supply of these materials, then the nation as a whole must bear the burden incident to such expansion. Under existing circumstances private enterprise and private capital have gone their limit. They have reached the limit for two reasons:—

I. The explosive, dye, and similar industries abroad, just referred to, are in a state of high development and of refined organization, and are financially the best suited to carry on an offensive campaign against any nation attempting to take business away from them.

II. Domestic manufacturers are prohibited by law from making use of co-operative commercial devices such as pools, trusts, manufacturing and selling agreements and the like, whereas such devices are wholly lawful abroad and are encouraged by the respective governments. In other words, the American chemical industry is expected to cope with the foreign industry while both its own arms are tied behind its back and its opponents have full and free use of their arms.

Anti-Dumping Clause.

The remedies required would include an effective anti-dumping clause that would certainly prevent under-selling of domestic manufacturers in the United States by unfair methods. What the form of such clause should be is a problem with which your Committee is unable to cope. It is strictly a law-making and law-enforcing problem, and is allied to the usual problem of determining under-valuation as heretofore carried on by our Treasury Department. It is, however, a much more refined problem than the older one of proving under-valuation. Nevertheless, your Committee believe that with such a mechanism in our law, much would be done towards encouraging our chemical industries.

To Create a Coal-Tar Chemical Industry.

According to the best information that your Committee can gather, such an anti-dumping clause alone would not be sufficient, however, to create complete and independent domestic coal-tar explosives, dyestuffs, and medicinals industries. It has been conclusively demonstrated during the past thirty years that the present tariff rate of 30 per cent. on dyestuffs is not sufficient to induce the domestic dyestuff industry to expand at a rate comparable with the consumption of dyestuffs in this country, and that therefore all dyestuffs made from coal-tar, whether they be aniline dyes or alizarin, or alizarin dyes, or anthracene dyes or indigo, so long as they are made in whole or in part from products of, or obtainable from, coal tar, should all be assessed alike—namely, 30 per cent. *ad valorem plus* 7½ c. per pound specific: and that all manufactured products of, or obtainable from, coal tar, themselves not dyes or colours and not medicinal, should be taxed 15 per cent. *ad valorem* and 3¾ c. per pound specific.

Tariff to Aid Dye Industry.

The best information and judgment your Committee can obtain is that the above manufactured products of coal tar, not dyes and not colours and not medicinal, should carry one-half the duty of the finished coal-tar dye, and that the above rate of 30 per cent. *ad valorem* and 7½ c. specific would probably be sufficient to encourage and enable domestic manufacturers to expand their operations to such an extent as to supply a very material increase in, if not the whole of, these commodities consumed in this country. The reason for a specific duty is to protect the domestic manufacturer in the manufacture of the relatively cheap dyes such as the cheap scarlets, the cheap yellows and the like, whose prices abroad are in the neighbourhood of from 12 to 20 c. per pound. With dyes of this type 30 per cent. *ad valorem* would not offer so serious an obstacle to importation and underselling thereof as does the 7½ c. per pound specific. On the other hand, on dyes whose prices are $1.00 and upwards per pound the function of the 7½ c. specific more nearly approaches zero. That is, with the cheap dyes the chief function lies in the specific portion of the duty, and with the expensive dyes the chief function lies with the *ad valorem* portion of the duty.

This is said to be the price the nation will have to pay to have a complete self-contained and independent coal-tar chemical industry. However, it must be remembered that if such an industry be created and the importation of coal-tar products, inclusive of intermediates and dyes, is restricted, its ultimate effect upon the Federal revenues will have to be considered. It will therefore be necessary to determine carefully if the advantages to be gained are equal to the price to be paid.

Patent Laws.

This Committee is a unit in the belief that an alteration of our patent laws aiming at compulsory working or compulsory licensing would not be of any substantial benefit to this industry or to the country as a whole. Twenty-nine countries have attempted compulsory licensing clauses, and fifty-six countries have attempted compulsory working clauses; and the best information your Committee can obtain is that in none of these attempts has there been any appreciable measure of success. While it may be true that under extraordinary conditions, such as now exist, compulsory licensing might have some advantage, yet it is equally true that in normal times the disadvantage due to compulsory licensing or compulsory working would more than overbalance any advantage at all likely to be obtained under stress of unusual conditions.

In none of the countries where there have been working or licensing clauses or both, co-extensive with the existence of the coal tar chemical industry, has there been established any real coal-tar chemical industry; and your Committee do not feel that an alteration in our present patent laws could be made which would be effective against foreigners and at the same time not be onerous and a hardship to domestic investors. Your Committee believe that in the long run and in the final outcome, our present system with regard to working and licensing is as efficient as that of any other country. In the dyestuff industry, in particular, there are so many non-patented commercial products and so many commercial products once patented, now free from patent restraint, that their production alone would form a basis for a very considerable industry, and your Committee feel that the way to encourage this industry, if the establishment of that industry in this country be a national necessity, is through a change in the tariff and the additional anti-dumping feature in the administration of the tariff, and not through any change in the patent laws. Once established, such an industry could develop and ultimately cope with any foreign combination upon fair and equal terms. Over 90 per cent. of the tonnage and of the individual dyes used in the United States will be free from any patent-restraint within the next four years. Over 75 per cent. of the dyes are now in this condition.

Availability of Raw Materials.

The best information your Committee have so far been able to gather is that this country can produce so-called coal-tar raw material in amounts sufficient for the needs of a complete domestic coal-tar chemical industry inclusive of explosives and dyes, provided there is a certainty of outlet as to volume and continuity. Those engaged in manufacture here do not want to expand unless the dye-users are willing to make corresponding contracts. In other words, it is a closed circle. If the dye-users will contract sufficiently with the dye makers, the dye-makers will contract with the coal-tar distillers, and the industry will take a start. The initiative rests wholly with the users. If they cannot afford to contract, the dye-maker and the distillers cannot afford to make their contracts and additional investments.

Coal-Tar Products.

Benzol, toluol, and the like are produced in sufficient amount in present installations of bye-product coke-ovens to provide all of these things that would be needed for a coal-tar chemical industry of a magnitude sufficient to supply the United States market. The separation of these materials from the gas that carries them is dependent upon the market and the demand therefor. There is no inherent defect in our coke industry with regard to the actual making of these things. The only question involved is whether it be more profitable to burn the benzol, toluol, and the like contained in the gas as a fuel than to separate them from the gas and from each other for the purposes of sale. Ample supply can be provided before any plant that could use benzol and the like for dyestuff making could be erected in the United States; and thereafter the supply of these materials can readily be kept up to any requirement.

The materials of the preceding paragraph are the ones used in the coal-tar explosives industry, as well as in the coal-tar medicinals and dyestuffs industries. Each of these three industries co-operates with the others to make full use of these materials. Alone, none can fully make use thereof nor succeed. The correct and proper utilization of these materials requires successful co-existence of all three industries in one and the same country.

Naphthalene and anthracene are contained in the tars produced in the United States in an amount sufficient for the needs of a domestic dyestuff industry; and it is merely a question whether it is more profitable to leave them in the creosote oil, where they now occur, or to separate them out of such oil, and refine them for purposes of dye manufacture. An ample supply of either of them could be produced and provided at the same time or shortly after any plant could be erected in the United States for the use of these things in the production of dyes.

What has been said with regard to the supplies of naphthalene is also true of the supplies of cresol. All the creosote oil contained in the total amount of coke-oven tar now made is separated from it and used. Increased production of creosote oil requires a greater production of tar, and a greater production of tar is dependent upon increased installation of recovery coke-ovens.

Phenol or carbolic acid supply is primarily dependent upon our deliberately selected method of coal treatment. To change the treatment so as to get more phenol would entail abandonment of other advantages which would not be compensated for by the increased amount of phenol so produced. Under present circumstances freights and haulages play an important part. At isolated plants, separated by considerable distances from each other, small amounts of phenol are produced. The separation of the phenol at such individual places would be economically unprofitable; and in order to concentrate this amount of phenol to or at a point where separation could be conducted profitably would entail freight haulages much in excess of the value of the phenol that would thus be transported. The only source of phenol in sight is that produced synthetically from benzol by means of sulphonation and subsequent melting with caustic soda. This depends, in turn, upon our benzol supply, and would be profitable only so long as the United States market is not killed by the dumping of foreign phenol thereon, whether such phenol be synthetic or distilled.

Salicylic production depends upon the availability of phenol, and the production of benzoic acid depends upon the availability of toluol, which has heretofore been discussed. Phthalic acid made from naphthalene by means of bichromate cannot successfully compete with that made by the mercury and sulphuric acid process which is protected by patents having about three years more to run.

Miscellaneous Chemicals and Raw Materials.

Acetic anhydride can be made without trouble in this country, and will be made in this country so soon as the domestic demand is large enough and steady enough to warrant the installation of a suitable plant.

All countries, with the exception of possibly Norway and the countries importing from Norway, are dependent upon Chili for the raw material for making nitric acid. It will not be profitable to make nitric acid from air in the United States until the value of the electric horse-power reaches a level of $3 or $4 a year, as it is in Norway.

Ammonia and its salts all depend upon recovery coke-ovens, and such recovery plants are increasing as fast as circumstances will permit.

After dealing with many other of the minor products coming under the above classification, the report concludes with some

General Remarks.

Finally, it should be pointed out that the United States is by no means the only country whose chemical and allied business has been strained or upset by the European war. All other countries have felt the strain. British committees have gone into this same subject of expanding British chemical industries, and, not only that, but also into the question of making their very basic necessities; and the reports have so far been adverse to any immediate relief by domestic manufacture. The Boston Chamber of Commerce, through its Committees, has arrived at the same conclusions for this country. It is further clear that the stability of a complete domestic chemical industry, in so far as it depends upon foreign supplies, is bound up to a successful merchant marine and to an efficient foreign banking condition just as is all our foreign business.

Findings.

Your Committee find as follows, as to the facts:

I. Prior to the hostilities, domestic chemical industry was utilizing and exploiting every reasonable opportunity to its full extent.

II. Since the outbreak of hostilities, domestic industry has increased its output just as fast as physical means could be provided and physical obstacles overcome.

III. Since the outbreak of hostilities, domestic plants that had heretofore been shut-down or partly dismantled because of disastrous foreign competition are said to have resumed operation with caution.

IV. That a 30 per cent. duty on some coal-tar dyes for over thirty years has not produced a real coal-tar dye industry in this country.

Conclusions.

The Committee submit their conclusions as follows:

A. To prevent the unfair underselling alleged to be practised by foreigners in this country, the adoption of an effective anti-dumping clause.

B. The so-called coal-tar "intermediates" which are the basis of the coal-tar chemical industry—inclusive of explosives, medicinals, and dyestuffs—should be assessed one-half of whatever the finished dyes are taxed for tariff purposes. All coal-tar dyes without exception should be taxed alike—namely, 30 per cent. *ad valorem*, and 7½ c. per pound specific.

C. Changes in the patent laws—such as by compulsory licensing or compulsory working clauses—are wholly ineffective, do more harm than good, and should not be attempted.

Gas Prices in Irish Towns.—The Athy (co. Kildare) Gas Company have intimated an increase in the price of gas of 5d. per 1000 cubic feet. The Coleraine Urban District Council have increased the price from 3s. 4d. to 3s. 9d. per 1000 cubic feet for lighting purposes, and from 3s. 1d. to 3s. 4d. for power; the rate for slot-meters (3s. 9d. per 1000 feet) to remain unchanged.

HIGHER PRICES AT NOTTINGHAM.

Proposed Postponement Defeated.

Submitting to the inevitable, the Nottingham Corporation, in face of an anticipated increase of £50,000 in the cost of coal required for the ensuing year, adopted at their meeting on Monday of last week a recommendation of the Gas Committee for raising the prices charged for gas to all consumers, except prepayment customers, by 12½ per cent. Slot-meter users will pay the same as before—3s. 4d. per 1000 cubic feet; but they by no means go unaffected by the revision of the list, inasmuch as they will lose the 1d. in the shilling rebate so far allowed. Hitherto the charges to which the increase of 12½ per cent. will now apply have been: For all purposes other than for power and "gassing," 2s. 4d. per 1000 cubic feet, if the consumption be under a million cubic feet per quarter, 2s. 3d. if a million cubic feet and under 4 millions, 2s. 2d. if 4 millions and upwards. For power purposes, if the consumption be under 500,000 cubic feet per annum, 1s. 10d. per 1000 cubic feet; if 500,000 cubic feet and upwards, 1s. 6d. For "gassing" purposes the charge has hitherto been 2s. per 1000 cubic feet for any quantity consumed. In adopting therefore a percentage basis of increase, the Committee had maintained the relative proportions of the charges falling within the several categories. But, as was to be expected, it was not without considerable criticism that the recommendations were adopted; the increase being especially unpalatable in a year in which the Corporation have been driven to the necessity of adding to the already heavy local burdens by increasing the district rate by 5d. in the pound.

Alderman A. Ball (the Chairman of the Gas Committee), in moving the adoption of the report, said it was very regrettable to every member of the Committee that they should have been driven to the necessity of recommending an increase. The Committee had for many years done all they possibly could to reduce the charges; but at the present moment they were faced by a condition of things over which they had no control. Coal had gone up on an average by 5s. a ton; and this would mean to the gas undertaking an increased expenditure of £50,000. He did not say exactly that the whole effect of the increase would be experienced this year in relation to the undertaking, but next year the full effect would be felt. The Committee had bought coal fairly well; but they had the greatest trouble in getting delivery at the present moment. Another difficulty operating against the financial results of the undertaking was the price of pitch. At the Nottingham works about 6000 tons of pitch were made last year; and the average price realized was 35s. per ton. This year it was only 17s. 6d. The Committee were suffering a loss of £5000 on pitch alone. In common with other large gas undertakings in the country, they were driven to the necessity of making an increase in the price of gas; but they were not suggesting that the amount should be made as large as in many other towns. Manchester had increased its price by 6d. per 1000 cubic feet, Birmingham by 4d., Salford by 9d., the South Metropolitan Company by 8d., and the Gas Light and Coke Company by 6d. The same might be said of almost all the large gas undertakings in the country. The increase of 12½ per cent. proposed to be made in Nottingham would represent an advance of something like 3d. per 1000 cubic feet on the price hitherto charged. He sincerely hoped they would be able to get through the present difficult conditions without a further rise.

Mr. Gover Ford (the Vice-Chairman of the Committee), in seconding the adoption of the report, said it was with the greatest reluctance that the decision to increase prices had been arrived at. The Committee, however, were the victims of circumstances, and had no alternative in the matter. A serious aspect of the situation was that the consumption was rapidly decreasing. If the diminution continued at the present rate, it would amount to a decrease during the year of something like 200 million cubic feet.

Alderman Huntsman said it seemed to him that the Committee were in a serious difficulty. After giving the matter full consideration, however, he felt that the report was somewhat premature. No doubt there had been a large increase in the prices of the commodities used by the Committee, and it was most unfortunate that this increase had been accompanied by a lowering of the rates realized for things of which the Committee had to dispose. It appeared to him that they were setting about at too early a period to increase the price of gas. At the present time prices were rising abnormally, and they ought not to join in anything which would stimulate this tendency. He contended that, having such large reserves at the back of the gas undertaking, they ought not at this stage to increase the price of gas. Gas was used locally in connection with many industrial undertakings, and in respect to them it was extremely undesirable to increase the price of the commodity. Upon many of the humbler residents in Nottingham the proposed increase would fall very heavily. He submitted that the Council ought not to authorize the proposed increase, and moved that the matter should be adjourned for at least six months, in order that, when the effects of the increased price of coal had been experienced, the question might be again considered.

Mr. E. Richards seconded the amendment, observing that Alderman Huntsman having very properly called attention to the large reserves at the disposal of the Committee, they should consider for what purpose these reserves had been built-up. Had they been established to meet such emergencies as had been caused by the present condition of affairs, so that something might be taken from them for the relief of consumers? The renewals and reserve funds in connection with the undertaking now exceeded £250,000; and he noticed that the Committee had been enabled to put aside £32,000 out of the year's profits towards renewal and reserve funds. There was a huge reserve, and he thought it might be used to meet necessities if they arose. But the necessity had not arisen yet. The Chairman of the Committee had called attention to the fact that the Manchester Corporation had increased the price of gas by 6d. per 1000 cubic feet; but he should like to direct Alderman Ball's notice to the circumstance that the Manchester authorities many years ago reduced the price to all consumers. A reduction had been demanded in Nottingham, and was long overdue. He had been looking at the accounts for the last ten years, and found that during this period the average price of gas in Nottingham had only been reduced by ½d. per 1000 cubic feet. Yet the profits, as disclosed

by the reports, were now £30,000 more annually than they were ten years ago. He understood that the Committee had sufficient contracts in hand for coal to last six or nine months. If so, he suggested there was no necessity for an immediate increase, and by adopting the amendment they would be enabled to see, when the time elapsed, how far the necessity had arisen.

Alderman F. R. RADFORD opposed the amendment, and urged that the gas undertaking must be treated upon the same lines as any other business concern. Questions of reconstruction and new processes were to-day constantly arising. Already the Committee had spent about £60,000 upon the installation of new vertical retorts at the Radford works, and it was proposed now to spend an equally large amount upon other similar work at Basford. The reserve fund was being constantly drawn upon to meet such expenditure. It was most important also that the fund should be built-up to meet other serious expenditure which might be entailed by explosion at the works or other happenings. The Committee had done their best to meet a difficult situation. It might have been proposed to make the increase 6d. per 1000 cubic feet; but the Committee had adopted the moderate course of recommending 3d.

Mr. OFFILER, in supporting the adoption of the report, said it was most desirable that the public should know the cause of the advance. It was not due to any mismanagement upon the part of the Committee, or the Chairman, or their Engineer. At no time in its history had the gas undertaking been better managed. The increase was due, in his opinion, to the rapacity of the coalowners, who had exploited the public by forming a ring, and forced up prices 50 per cent. beyond the point at which they stood this time last year. Much as he regretted raising the price of gas, he thought there was no alternative but to support the Committee's recommendation.

Alderman HOUSTON asked the number of gas consumers taking the municipal supply but residing outside the city.

Mr. BOWLES said he would have supported the adoption of the report had the Chairman of the Committee said he would propose an increase in price contingent upon it being shown at the end of the year that there had been a loss on the working of the undertaking. He had not told them, however, that there would be a loss. What the proposal of the Committee really amounted to was that the price of gas should be increased by 12½ per cent. in order that the profits for the relief of the rates might be maintained. Something like 7d. or 8d. in the pound of the municipal rates had been paid out of the gas undertaking. If the profit had not been made at the expense of the gas consumers, an increase to this extent in the district rate would obviously have been necessary. The question was whether it would not be more fair that an increase should be made in the district rate, and every ratepayer would be required to bear his proportionate share, or were they going to increase the price of gas so that a section of the community which used it bore the whole brunt?

Alderman BALL, replying on the discussion, said it would no doubt be a very popular thing to vote for the amendment, and if he could do so conscientiously he would support it. He was adopting the views of wise men who controlled some of the largest gas undertakings in the country when he suggested that the Council should adopt the very moderate increase in price recommended by the Committee. He wished to make it quite clear that the Committee had just grounds for adopting this course. In the first place, one of the most important points was—why should they give to customers outside the municipal area the full benefit of any good purchases they might have made, either of coal or any other commodities needed in the manufacture of gas? Quite 25 per cent. of the gas sold under the authority of the Committee was consumed by people who lived outside the city; and surely those who might be inclined to support the suggestion which had been made by Alderman Huntsman would not wish to make a large present to the outside consumers at the expense of Nottingham ratepayers. They had been told that the Committee's report was premature; but he did not think it was. To take one item alone, he might mention that they were spending from £40,000 to £50,000 a year in repairs. All steel work had gone up 40 per cent.; fire-clay had advanced by 25 to 30 per cent.; there was a matter of the bonus to the men (and as to this they did not know whether they had got quite to the end); and they would have to pay 5s. a ton more on coal—not on all, but all round. In addition to this, the Committee would be £5000 down on the sale of pitch, and there was also a decreased consumption of gas to be considered. So that an increase in price was inevitable unless the Council were going to make serious inroads on the reserve fund. He could not comprehend any man who understood the management of large commercial undertakings doing this; for reserve funds were never meant to be used for such a purpose. The reserve fund was to meet contingencies of an unusual character which might easily arise in connection with gas-works. Their works were not insured; and he asked the Council to think what would happen in the event of a huge fire and explosion. The reserve fund would then quickly go. It would be a wicked thing to use it for other than its legitimate purpose. It had been said that the reserve fund of the undertaking amounted to £250,000; but it must be remembered that £70,000 of this had already been ear-marked for new works, and when completed they would be paid for. They must be fair in dealing with these matters; it was no use making certain proposals and statements merely for the sake of popularity. Why did Mr. Richards attempt to mislead the Hall, by telling them that the price of gas in Nottingham had only been reduced during the last ten years by ½d. per 1000 cubic feet? As a fact gas had been reduced by 2d. per 1000 cubic feet; prepayment consumers being granted a rebate of 1d. in the shilling. The average had not been more because of the increase in prepayment consumers, who were provided with stoves and meters free. He urged the Council to act wisely in the matter and not to be misled by any seeking after popularity. The Gas Committee had jumped to no rash conclusion. They could see no alternative but to recommend an increase in price to the extent of 12½ per cent., which would make 3d. per 1000 cubic feet. The Committee had arrived at the decision with reluctance; and he believed the Council would be well advised to adopt their view.

The amendment was defeated by 22 votes to 11, and the Committee's report in favour of the increased price was afterwards adopted.

COAL AND GAS PRICES AT BRADFORD.

Both coalowners and coal miners came in for criticism during a meeting of the Bradford City Council last Tuesday, when a recommendation of the Gas Committee, that the price of gas should be increased 5d. per 1000 cubic feet, was under discussion.

Mr. STAMFORD moved as an amendment that the following words be added to the recommendation: "That in view of the fact that the increased price of gas is largely necessitated by the extraordinary rise in coal prices, this Council urge the Government to give immediate effect to the recommendation of the Departmental Committee on Coal Prices, and assume control of the output of collieries during the period of the war." He urged that there was nothing to warrant the large increase of prices made by coalowners in the United Kingdom. He was quite certain that if the increases in the price of coal were clearly necessitated by circumstances arising out of the national crisis, no one would make serious complaint. But this was not the case; and the Government ought to be urged to protect local authorities and the public generally against the rapacity of the private owners of the coal supplies of the country. The fact was that in England at the present time there was a small section of the community taking deliberate advantage of a grave national crisis to extort increased plunder out of the necessities of the people. He contended that there had been no serious diminution of supplies for home consumption. There was some shortage of labour due to the number of colliers who had enlisted; but, on the other hand, restrictions had been placed upon the exportation of coal. By far the largest part of the rise in price was borne by the poorest section of the community; and at a time like this it ought to be regarded as a national crime that private monopoly should saddle the community with such grave increase of prices.

Alderman R. JOHNSON said that probably the country would be driven to some form of Government control of the coal mines, not by the rapacity of the coalowners, but by the rapacity of the colliers, and the unwise advice of the political demagogues who ruled the colliers. The demagogue who went down the pit twenty-five years ago, and who had given it up for a better job, had been instrumental in getting the colliers a war bonus of 15 per cent. because of the difficulties of the country. And who was paying this, and more? It was paid by the poorest people. The people who were only earning some 25s. a week were at the mercy of colliers who would not work more than two or three days a week, though in each of these days they could earn 20s. to 25s. The poor people were paying an increased price for coal which was caused, not by the rapacity of the colliery owners, but by the rapacity of the colliers, who were earning as much a day as many of the people who had to pay the increased price of coal were earning in a week. There was no such thing as private monopoly. The only people who controlled the collieries were the black-coated gentlemen who controlled the colliers—the people who lived upon the silly public, and whom the silly public had no more sense than to believe were trying to do them a bit of good. He did not care how soon Parliament did control the pits; for then these people might have to do their full week's work or go to gaol.

Alderman S. DEIGHTON said the amendment was really an effort towards bringing about the nationalization of coal supplies. Moreover, it was not true that the advance in the price of gas was chiefly due to the advance in the price of coal. It was due to several other circumstances besides. For one thing, the Committee had been supplying gas below cost, and had depleted their reserves. For another, there had been a considerable reduction in the amount of gas consumed. Again, the department had suffered severely on account of the war. It had lost a great deal of money owing to the fact that pitch had become valueless, and also to the decline of revenue from coke.

Alderman M. CONWAY said that Alderman Johnson seemed to have forgotten that the chief rise in the price of coal came before the miners got their war bonus.

Alderman J. HAYHURST said that, as to the question of a war bonus for miners, Mr. Asquith apparently thought there was something in the miners' claim; for he referred it to the Conciliation Boards, undertaking to make an award if the Boards did not agree. If Mr. Asquith had thought that miners' wages were too high, that they were too lazy to work, that they only worked two days a week and earned 25s. for each day they worked, then he would have decided that miners' wages should remain as they were. But Mr. Asquith did no such thing. Alderman Johnson had had an opportunity of speaking on these questions in a miners' constituency; and he did not remember that in any speech he made the alderman charged the miners there with being too lazy to work, or with working only two days a week, or even with earning 25s. a day.

Mr. J. H. BARRACLOUGH said the question was serious; for if things did not alter, coal would cost the Gas Department next year £50,000 more than last. If Mr. Stamford's amendment did not go so near to suggesting nationalization, he thought the Council would accept it.

Mr. E. J. SMITH asked if Mr. Stamford objected to using the exact words of the Departmental Committee's recommendation.

Mr. STAMFORD said he would not, as the recommendation was what he wished to press upon the Government.

With the understanding that the amendment should be redrafted in the terms suggested, it was carried; and the minutes as amended were approved.

Rise in Price at Exeter.—The Secretary and Manager of the Exeter Gas Company (Mr. W. N. Westlake) has issued a circular saying the Directors regret that, owing to the heavy extra cost of manufacture, due to the rise in the price of coal and all materials, and also rates of wages, the price of gas will be raised 4d. per 1000 cubic feet as from the taking of meter-indices at Midsummer, for as long as the present stringent conditions continue. The prices will then be as follows: For general purposes, 2s. 10d. per 1000 cubic feet; over 50,000 feet and under 250,000 feet per half year, 2s. 6d.; over 250,000 feet per half year, 2s. 3d. These prices will be subject to the usual discounts. The quantity of gas per penny supplied through slot-meters will be reduced to 22 cubic feet.

WEST BROMWICH GAS-WORKS RESULTS.

Report of the Engineer.

Some particulars from the report of the Borough Treasurer (Mr. H. Kirk) with regard to the operations of the West Bromwich Corporation gas undertaking during the past financial year were given in last week's issue [p. 590] in connection with a discussion in the Town Council. Additional facts appear in the report of Mr. W. H. Johns, the Gas Engineer and Manager.

After pointing out that this is his first annual report, Mr. Johns says some of the horizontal retort-settings have been renewed with moulded retorts; and as the vertical retorts are now in full work, there will, with the aid of the water-gas plant, be sufficient producing capacity to meet the maximum winter requirements during the next two or three years, unless abnormal increases in gas consumption are obtained. If the carburetted water-gas plant had not been available last winter, every retort would have been in action to maintain the supply of gas. With this plant at work, four retort-settings were held in reserve. The cost of maintenance of works during the past year has amounted to £4326, as compared with £3927 for the previous year, or 2·48d. as compared with 2·42d. per 1000 cubic feet made for the previous year. The gas used on the works amounted to 5,888,000 cubic feet, against 5,748,000 feet; the increase being due to the installation of gas-engines for driving the extractor gear on the vertical retort plant.

Wages expended on carbonizing and water-gas manufacture amounted to £2599, or 1·49d. per 1000 cubic feet of gas made, compared with £2868, or 1·77d. during the previous year; the decrease being due to the adoption of vertical retorts. This decrease would have been greater had the vertical retorts been available throughout the whole of the twelve months. Probably the figure would have been reduced by £800. The whole of the new retorts had to be reset on his arrival in West Bromwich; and the full advantages were therefore not obtained, as it was found necessary to work both the water-gas plant and the horizontal settings during the portion of the year when the new installation alone would have been sufficient for the supply to the town, had it been available. The vertical retorts are now working well; the guaranteed results having been attained on test. The plant was taken over from the contractors last September. Great difficulty was experienced during the winter with regard to the supply and delivery of coal and oil for gas-making purposes. However, the supplies at the present time are coming in better, and the stocks are being made up. The coal carbonized was 31,458 tons, as compared with 33,911 tons; the coal gas made being 378,356,000 cubic feet, against 379,164,000 feet. The make of gas per ton of coal carbonized has been 12,026 feet, as compared with 11,177 feet. The cost of coal and oil during the year amounted to £25,391, as compared with £26,849 for the previous year—coal having been purchased at approximately 1s. per ton less. A great advance will have to be met in the current year; and it will therefore be necessary for the Committee to consider the question of increased charges for gas supplied in the borough.

The cost of manufacturing carburetted water gas amounted to £2127, or 12·97d. per 1000 cubic feet, as compared with £884, or 21·12d. The quantity of carburetted water gas made was 39,345,000 cubic feet, or 9·42 per cent. of the total gas made, as compared with 10,049,000 feet, or 2·58 per cent. last year. During the early part of the year the oil was bought at a very favourable figure; hence the larger quantity of water gas manufactured. It was also considered advisable to increase the percentage of water gas in order to reserve the coal stocks.

Wages for purification amounted to £239, as compared with £318; the reduction being due to improved working and the introduction of a Weck valve. The net cost of purifying amounted to £50, after sale of spent oxide. The total quantity of gas made during the year was 417,701,000 cubic feet, as compared with 389,213,000 feet in the previous year. The average calorific value of the gas was 569 B.Th.U., as compared with 585 B.Th.U.; and the average illuminating power 15·19 candles, against 14·95 candles. There has been an entire absence of naphthalene trouble, in which result he is convinced the gas made in the vertical retort plant has played a prominent part.

The total wages paid at the works amounted to £5670, or 3·26d. per 1000 cubic feet made, as compared with £6323, or 3·90d. Some concessions were granted during the latter part of the year to the men engaged on the vertical retort plant; and the general wages were advanced 2s. per week per man. The men have further been granted a reduction in working hours from 54 to 53 hours per week. Active service allowances have been made to the employees who have enlisted for the war from the works and outdoor department; and allowances have also been granted to four members of the staff at the works who have enlisted, amounting to a total of £136.

The total manufacturing charges amounted to £36,699, as compared with £39,449.

The total coke produced amounted to 15,564 tons (less coal being carbonized), as compared with 18,955 tons. The revenue from sales of coke amounted to £8286, against £10,461. During the early part of the year the prices obtained for coke and breeze were low, owing to the large quantity available. Prices have, however, stiffened lately, and at the moment stocks are depleted at these and other works throughout the country. Owing to the great advance in the price of coal, it will become necessary in the near future to increase the price of coke and breeze. The yield of tar during the year was 392,734 gallons, or 12·48 gallons per ton of coal carbonized, as compared with 332,849 gallons, or 9·82 gallons per ton. A favourable price was obtained for tar; but it is expected that when the new contract is entered into the price will be reduced very considerably. The yield of ammoniacal liquor amounted to 1,003,483 gallons, or 31·90 gallons per ton of coal carbonized, as compared with 955,321 gallons, or 28·17 gallons per ton. The manufacture of sodium ferrocyanide has been continued through-

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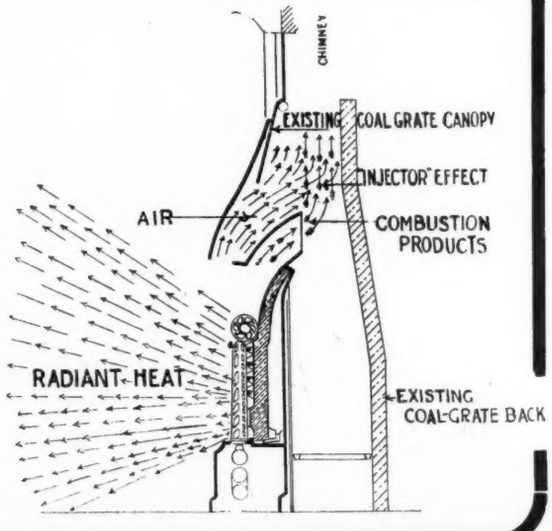

out the year. The receipts amount to £417, as compared with £361. The quantity of cyanogen in the gas, since the introduction of the vertical retorts, has been found to be considerably less than that produced when the horizontal settings alone were at work. The amount recovered in the cyanogen plant will consequently vary in proportion to the number of horizontal settings at work from time to time. Notwithstanding the smaller quantity in the gas, the revenue has increased; the market value having improved owing to the war.

Mr. Johns says he is pleased to be able to report a record increase in the sales of gas, amounting to over 29 million feet (including the gas used on works), or an increase of about 8 per cent.—being the largest yearly increase in the history of the undertaking. It will be necessary in the near future to consider the question of extending the gasholder capacity at the works, the capacity at the present time being: Coal gas, 1,500,000 cubic feet; water gas, 250,000 feet.

Several large furnaces and stoves have been installed in the district; and the department are now dealing with many more inquiries received for this class of apparatus. The compressing plant at the show-room, used in connection with the lighting of High Street and for the supply of high-pressure gas generally, has been extended during the year; and a new compressing station has been erected in the Walsall Road, by which means the supply of gas to the Hall Green district has been greatly improved—the pressure at this point for some time having been found insufficient. The sales of gas-fittings amounted to £1872, as compared with £1889; and the maintenance of incandescent burners cost £308, against £373. There having been a large addition to the number of consumers' burners maintained, the income was £405, compared with £358. The number of gas-cookers fixed on the hire-purchase system was 115, and gas-fires eight. During the year the new system of hiring-out cookers and gas-fires to ordinary consumers on the simple-hire system was put into operation, 305 cookers and 293 gas-fires being fixed during the year—a total of 643 cookers and 301 gas-fires. The number of public lamps is now 1191 (of which 1135 are fitted with incandescent burners). The remaining flat-flame burners are being converted to incandescent.

The Gas Committee on Saturday instructed Mr. Johns to issue a notice stating that, in consequence of the great advance in the price of coal, they have found it necessary to revise the charges for gas in the borough as from July 1. The new scale of charges will be: For motive power and manufacturing purposes (other than lighting) less than 200,000 cubic feet per quarter in one building, 2s. 1d. per 1000 cubic feet; 200,000 feet and upwards, 1s. 10d. For purposes other than motive power and manufacturing (in one building), less than 25,000 cubic feet per quarter, 3s. per 1000 feet; 25,000 to 50,000 feet, 2s. 10d.; 50,000 to 500,000 feet, 2s. 8d.; 500,000 feet and upwards, 2s. 7d. High-pressure lighting, 3s. 6d. per 1000 cubic feet, less a discount of 5 per cent. for prompt payment. Prepayment consumers, 24 cubic feet for 1d., or at the rate of 3s. 6d. per 1000 feet net.

COCKERMOUTH GAS-WORKS RESULTS.

In his report to the Cockermouth Urban District Council on the working of the gas undertaking for the year ended March 31, Mr. E. D. Wootten (the Manager and Secretary) says that, under the exceptional conditions prevailing, it is particularly pleasing to be able to state that this year the gross profit exceeds last year's by £147; being £1333, against £1186. Payments of interest on loans and to the sinking fund were respectively £397 and £464, leaving a net profit for the year of £470. Of this amount £148 was expended on the completion of the retort extension contract, and on the installation of a new 10-H.P. gas-engine. The working balance is thus increased by £322, and now stands at £2897. The revenue from gas and stove hire was a little more than last year's; but the revenue from residuals was less. At one period of the year coke was a drug on the market, and the price was reduced in consequence. A reduction was recorded for tar, owing to a slump in prices. The sulphate of ammonia market suffered serious depreciation, due to a combination of circumstances arising out of the war. The depreciation in value was countered by an increased yield of 5½ tons, so that the net revenue was approximately the same. Turning to the expenditure, coal cost £266 less, due to an increased yield per ton of coal—which now stands at 11,648 cubic feet, as against 10,300 cubic feet five years ago—and to a reduction in price of 9d. per ton on the contract from July 1, 1914.

On the subject of rate-relief from gas profits, Mr. Wootten makes the following sound remarks: "The balance in the hands of the Treasurer at the end of the year was £1054, from which there is to be deducted the £300 transfer to the rate fund. I should like to take this opportunity of expressing my opinion on the question in general of using gas funds for the relief of the rates, but without desire or intention of referring to this particular transfer. It is a firmly established fact that the cheapening of the gas supply increases the gas sales; and it is no less incontrovertible that, other factors remaining unaltered, an increase in sales tends to cheapen the supply. Any moneys transferred to the rate fund are moneys that would otherwise be devoted to the cheapening of the supply; therefore such transfers hinder the development of the undertaking. Very wisely, the principle of rate aiding has not hitherto been accepted at Cockermouth; and it is attributable to this mainly that Cockermouth occupies an almost unique position for its size in supplying gas at 2s. 9d. per 1000 cubic feet. If I were asked to advise, I would say most strongly, in the interests of all gas consumers, and particularly in the interests of the poorer class—of whom there are more using gas than paying rates—continue the policy of supplying at cost price; for it is at the same time advantageous and equitable."

In presenting the report to the Council, Mr. Dickson said it was an excellent one in every respect. The works had been improved each year, and the results obtained had proved that the money had been wisely spent. The gross profit for the year was equal to 11d. per 1000

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cubic feet of gas sold, which, with gas at 2s. 9d., was a result that he thought was unequalled by any town of 5000 population. There had been an improvement in the make of gas per ton and in the yield of sulphate of ammonia; while the coke and tar figures were also very good. Mr. Wootten was entitled to much praise for these results. They wished to avoid if possible increasing the price of gas; and so long as they were not asked to contribute anything more to the rates, he thought they would be able to manage.

A GAS-WORKS PROVIDENT SOCIETY.

South Metropolitan Company's Scheme.

The report of the Committee of Management and the accounts of the South Metropolitan Gas Company's Employees' Provident Society (approved under the National Insurance Act), from Jan. 12 to Dec. 31, 1914, have been forwarded by the Secretary, Mr. Henry Lesser.

The report (which is signed by the President, Mr. Charles Carpenter, D.Sc.) states that, with very few exceptions, all the regular employees of the Company are members of the Society. Membership has increased from 5341 at Jan. 11 to 5476 at Dec. 31. Since the outbreak of the war, no fit man of military age has been admitted to the Company's permanent or regular staff. Hence the number of new members eligible for membership of the Society has been considerably restricted. Whether an employee joins the Society is a matter entirely for himself. No canvassing of any kind is permitted. The Company have continued to provide the Society with funds to pay sickness benefit from the first day of illness, and to increase the benefit of insured persons from 10s. to 12s. a week. The total amount of these additional payments for the year was £882. The extra benefit fund continues to attract thrifty members under 40 years of age. The Company's guarantee assures to a sick member an additional 6s. per week for an extra weekly contribution of 3d. At the present time, there are no fewer than 3363 contributors to the fund. The benefits administered by the Society are: (*a*) Sickness benefit, (*b*) disablement benefit, (*c*) maternity benefit. The benefits administered by the Insurance Committees are: (*d*) Medical benefit, (*e*) sanatorium benefit.

As to the effect of the war on the Society's funds, it is remarked that, "out of a total of 5476 members, no fewer than 1265, or more than 23 per cent., are serving with His Majesty's forces. While we are extremely proud of this record, it should be observed that the country's gain is the Society's loss. The men with the Colours are our choicest lives. Under the National Insurance Act, their rate of contribution is reduced from 7d. to 3d.; but they are entitled only to maternity and sanatorium benefits. On resuming their normal occupations after discharge from the army or navy, they will revert automatically to their position in the Society before the change took place. Meanwhile, the amount available for administration expenses in respect of such members is diminished by one-half—namely, from 3s. 5d. to 1s. 8½d. per member per year. Hence, should the war continue for the whole of the year 1915, the net loss to the Society, on the present figures, will amount to about £108. This is the decision of the Insurance Commissioners after pressure from the approved Societies, who objected to the reduction to 8d. a year originally proposed. Another unforeseen liability to which the Society is exposed arises in respect of totally disabled soldiers and sailors who are discharged on pensions in consequence of the present war. By the National Insurance (Part I. Amendment) Act, 1915, such members are ordinarily to be entitled to benefit from the Society at the rate of 5s. a week for 26 weeks following discharge, together with medical, sanatorium, and maternity benefits. In view of the large proportion of our members who are now on active service, the menace to our benefit funds is obvious. We heartily agree that men stricken in their country's service should be cared for, if need be, to the last shilling; but it seems to us rather unfair that an extra burden should be placed on one section of the community, when the responsibility is that of the nation at large."

NOTTINGHAM WATER UNDERTAKING.

Additional demands upon the Nottingham Corporation Water Committee have been experienced during the last year, arising mainly out of increased requirements in connection with the Derwent Valley Water Board; but in their annual report just submitted to the Council, the Committee expressed satisfaction that they had been enabled to meet the financial strain without making any demands upon the municipal exchequer. In addition to satisfying a precept for £23,727, Nottingham had to pay the Board £5584, being its share of the refund to the Sheffield Corporation on account of over-payments extending over many years, arising out of the arbitration award upon matters long in dispute. In this connection, the Committee were pleased to report that a settlement has been arrived at with the Sheffield Corporation in respect of the Bill which that authority were promoting in Parliament to amend the Derwent Valley Water Act—the Bill having now been withdrawn and all litigation being at an end.

Earnest consideration had been given by the Committee to the problem of the Derwent Valley water supply. For some time it was thought that the troubles experienced in Nottingham would also be felt in Leicester and Derby; and for this reason there was a probability of a joint scheme being devised for dealing with the water at or near its origin of supply, which would avoid further direct capital expenditure by the Committee. It would appear, however, that while ultimately this development might follow, the towns in question are not disposed to immediate action; and as they are taking their share of the water meantime, they do not feel the situation so acutely as Nottingham.

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NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

In the Glasgow Corporation, Bailie Irwin, the Convener of the Gas Committee, when moving approval of a minute dealing with coal contracts, said they had invited the coalowners of Scotland to make offers for the supply of about 800,000 tons of coal for the current year. The Committee had only thirty days from the date of the advertisement for offers until that day for accepting them. He asked the members to make a departure from the usual procedure (solely on the ground that the times were abnormal), and to adopt the Committee's suggestion that the offers be remitted to Mr. Alex. Wilson (the General Manager) and a Sub Committee, empowering them to negotiate on some of the offers, and to accept those considered satisfactory. Mr. Taylor objected to the giving of power to a Sub-Committee to purchase this large quantity of coal within thirty days at current prices. Under the powers the Gas Committee already possessed, they could go on purchasing the supply from month to month; and he moved that they adopt this method for a further period. The Government were proposing to take action with a view to lowering the price of coal. If the Corporation adopted the minute and bound themselves for a year, they would get no benefit should the Government take action. The method of purchasing month by month was a form of insurance to protect them against the exorbitant demands of the coalowners. Ten voted for Mr. Taylor's proposal; and the minute was carried by a considerable majority.

The Kilmarnock Gas Order Confirmation Bill, which has now been printed, is to confirm a Provisional Order under the Burgh Police (Scotland) Act, 1892, for the purpose of conferring further borrowing powers upon the Corporation for the extension and improvement of the gas-works. The sum of £20,000 is named, in addition to the amounts already authorized, and raised, under the Corporation's Act of 1871, and Orders of 1901 and 1912. The Bill contains the Treasury restriction on the exercise of borrowing powers.

Among other increases in the price of gas notified during the past few days are rises of 10d. per 1000 cubic feet in the cases of the Catrine, Dunlop, and Tillicoultry Gas Companies. This will make the price in Catrine 4s. 7d. per 1000 cubic feet, in Dunlop 5s. 10d. (with 5s. for cooking purposes), and in Tillicoultry 4s. 2d. Dearer coal and smaller returns from residuals have necessitated at Kilmarnock a rise of 5d. per 1000 cubic feet in the price of gas, making the charge 2s. 8½d.

In connection with a decision to increase the price of gas in Arbroath to the extent of 6d. per 1000 cubic feet, it was stated at a meeting of the Gas Committee that since the price was reduced three years ago to its present figure of 2s. 5d. per 1000 cubic feet, the increased charges which had had to be met for coal, labour, &c., were equivalent to 1s. 3d. per 1000 cubic feet. A large part of this, however, had been met as the result of economies achieved by the working of the new vertical retorts and otherwise; and with these economies, and also by using up the large profit balance of the past year, it had been found that an increase of 6d. per 1000 cubic feet would cover what was needed to meet the increased price of coal, the lowest tender for the year's requirements of which showed an increase of 8s. 3d. per ton over last year.

At Dunfermline, on Monday of last week, Sheriff Umpherston issued two interlocutors dismissing actions for damages against the Town Council arising out of an explosion of gas which occurred in a dwelling-house in Newmills, near Dunfermline. Henry Hoggan, the owner of the house, sued the Council and Messrs. James Inglis and Son, plumbers, for £123 in respect of damage to the place, and James Bannerman, the tenant, sued for £50. The actions against the Council were dismissed with expenses. The Sheriff, however, allowed proof in both actions against the plumbers. He held that the Council's liability ceased when the gas entered pursuers' supply-pipe.

The Glover-West system of vertical retorts is to be installed in the Gas-Works at Wishaw. The estimated expenditure on the new retort-house, which will take about a year to complete, is placed at £11,600. An early commencement is being made with the work.

Tenders were accepted by the Helensburgh Town Council at their last monthly meeting for 6500 tons of coal for the gas-works at an increased average price of 5s. 7d. per ton. Referring to this, one of the members said that without doubt it would soon be necessary to increase the price of gas. The annual report of the Manager (Mr. D. Fulton) stated that the make of gas for the twelve months had been 80 million cubic feet.

A dividend has been paid by the Leven and Methil (Fife) Gas Company of 15 per cent., including a bonus of 5 per cent.; and the sum of £1028 is carried forward. The presence of the military has accounted for a large increase in the consumption. The Buckhaven Town Council have given notice that they propose to acquire the concern.

Feeling that they are already paying the standard rate of wages, the Cambuslang Gas Company last Saturday refused a demand by their stokers for an increase. The men thereupon took themselves off; and the Directors appointed other employees in their places. The same evening, a man named George Foster, employed by Messrs. Robert Dempster and Sons, of Elland, who are at present erecting a new holder for the Company, had been engaged working at a boiler; and on leaving the works for tea, he was attacked by the strikers, and badly knocked about.

It was stated last week that employees of the Coatbridge Gas Company had left their work owing to the refusal to grant them a war bonus. According to reports appearing in the Press, considerable inconvenience was caused to the inhabitants, and particularly to shopkeepers on the Saturday evening—the gas being cut off. There was a conference between the gas officials and the strikers that afternoon; and a compromise was arrived at. The men claimed an increase of 9d. per shift. It was agreed to grant 6d., and settle the extra 3d. in dispute by arbitration. On these conditions, the men returned to work in the evening; and on Sunday there was a plentiful supply of gas.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *June* 14.

The position of London tar products is steady, and the following values may be taken as representative: Benzol, 1s. 2d., net and naked at makers' works; commercial toluol, 2s. 4½d. net and naked at makers' works; solvent naphtha, 2s. net and naked at makers' works; 60's crude carbolic acid, 3s. 6d. to 3s. 7½d. net, casks free; creosote, 4½d. to 4¾d., net in bulk at makers' works; anthracene, 40 per cent., 2¼d., packages free; pitch, 26s. net per ton in bulk at makers' works. There is still a great demand for all quantities of naphthalene and creosote salts, and record prices are obtainable.

Sulphate of ammonia is in a firm position, and the price is £13 10s. net per ton for 25 per cent. quality filled into buyers' bags at producers' works, for delivery any time to June next year.

Tar Products in the Provinces.

June 14.

The markets for tar products have remained firm throughout the past week. The demand for pitch has slackened somewhat, but makers keep firm in their idea of value. Creosote is still very quiet and difficult to sell. Solvent and heavy naphthas are in very good demand. Business is still brisk in crude carbolic, and there are inquiries for delivery over the first six months of next year; in fact, some business has actually been done for this period.

The average values of gas-works products during the past week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 22s. to 23s. per ton; Norfolk, Suffolk, and Humber ports, 19s. to 20s.; West Coast, 20s. to 21s. Manchester; 21s. to 21s. 6d. Liverpool; 23s. to 24s. Clyde. Benzol, 90 per cent., naked, North, 10½d. to 11d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 11d. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3d. to 3¼d. Heavy oils, in bulk, 3¾d. to 4d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 3s. 6d. Naphthalene, £8 to £16; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *June* 12.

Throughout the week there has again been a very firm tone in the market for this material, and slightly higher prices have been paid in the near position. There has been a good demand from direct buyers as well as from middlemen, and apparently most manufacturers are comfortably situated as regards stocks. The nearest values at the close are £13 18s. 9d. per ton f.o.b. Hull, £14 per ton f.o.b. Liverpool, and £14 3s. 9d. per ton f.o.b. Leith. The highest figure at which business has transpired for future delivery is still £14 5s. per ton at the principal ports, but it is reported that this price has now been paid for July-December, 1915, as well as for January-June, 1916.

Nitrate of Soda.

There has not been any further decline in the value of this article, and quotations are repeated at 12s. 3d. per cwt. for ordinary quality, and 12s. 6d. for refined, on spot.

Sulphate of Ammonia.

From another source it is reported that this market continues firm, and business has been done for the forward position at slightly above to-day's values. Outside London, makes are quoted at £13 to £13 2s. 6d.; Hull, £13 15s. to £13 17s. 6d.; Leith £14 to £14 2s. 6d.; Liverpool, £13 17s. 6d.; Middlesbrough, £13 15s. to £13 17s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is quiet; for though the deliveries are good on old contracts, there is not much new business doing at present. Some refusal of export licences throws at times cargoes of coal on the market; and thus for this surplus the prices are occasionally weaker. In steam coals, best Northumbrians are 21s. to 22s. per ton f.o.b.; second-class steams are about 18s. per ton; and steam smalls are steady at 15s. to 16s. 6d. per ton. Some of the steam coal collieries are working short time, chiefly because of the cause mentioned above, though the governmental requirements may improve the position. In the gas coal trade, shipments are fair for the season, but the new demand is not heavy. Best Durham gas coals are 21s. to 22s. 6d. per ton f.o.b.; second-class kinds are 19s. to 20s. per ton; and "Wear Specials" are still near 24s. per ton f.o.b. One or two contracts are in the market—one for Blyth, and another for a south coast gas company; but there is some reluctance to buy or sell far ahead just at present. The freight on gas coals, Tyne to London, is still about 7s.; and rates to some of the allied countries are firm, because of the scarcity of ready tonnage. Coke is generally firm. Gas coke, being scarcer through lessened production, seems rather higher. It is now quoted at 21s. to 22s. per ton f.o.b. in the Tyne.

Walsall Gas Undertaking.—The Walsall Gas Committee have decided to increase the price of gas 5d. per 1000 cubic feet to ordinary consumers, and to reduce the discount to prepayment consumers, representing an increased charge of 4d. per 1000 feet. Corresponding increases will be made to consumers in districts outside the borough. The Committee report a net profit for last year of £7694; and of this £2000 will be devoted to the rates, and the balance will be carried to the current account.

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Long Eaton Electricity Charges.—Since the correction which was administered by the Law Courts to the Long Eaton District Council, regarding their attempted preferential exploitation of electricity supply in opposition to the Gas Company, matters do not appear to have improved in relation to that branch of the authority's work. It was reported at the last meeting of the Council, yesterday week, that there was a deficiency on the electricity accounts amounting for the year ended March 31 to £752. In the hope of improving the position, a suggested revised scale of charges was submitted by the Committee, embodying the following rates: Lighting for domestic purposes, 4d. per unit, less 5 per cent.; factories, 3½d. per unit for the first 2000 units, and afterwards 2½d. per unit; public lighting, 2d. per unit, less 5 per cent.; power, for the first 1500 units, 1½d. per unit, exceeding 1500 units 0·85d. per unit, less 5 per cent.; heating and cooking 1d. per unit, less 5 per cent. The revised scale was adopted.

No War Bonuses at Darwen.—At the last meeting of the Town Council, it was sought to refer back a resolution in which the Council declared their intention not to increase any wages of Corporation employees during the continuance of the war. Mr. Kay, however, declared that if this was done the Council would stultify themselves. It was a declaration of policy that they objected entirely to the principle of a war bonus, and that they thought a war bonus was not justified where there was no increase in the number of hours worked or in the work done. The only justification for it was that there had been an increase in the price of all foodstuffs; and it was urged that they, as a Corporation, must indemnify their employees as a result of the war. Whoever else suffered, whoever else went in want, a corporation employee must be indemnified by the general ratepayers for the increased cost of food. He was glad that many corporations were awakening to the danger of giving war bonuses, and were refusing them. Analyzing the position, they found it was nothing but selfishness. Only three voted for the amendment, and twelve against.

A Financial Question at Rickmansworth.—The Rickmansworth Urban District Council have considered a letter from the Local Government Board, intimating that they could not advise the Council upon the management of their gas undertaking. Mr. Catesby suggested that a letter be sent to the Treasury. They wanted to know, he said, how they were situated with regard to getting fresh meters and putting in new supplies. They had no capital to go on with. They were not allowed to spend money out of revenue; and the result was they had no meters. If any customers came along, they could not supply them. If they had to keep the gas-works going as a business concern, it was necessary that they should have some power. The Local Government Board refused to help them in any way. The Council agreed to write to the Treasury on the matter.

Stockport Gas-Works Development.—At a Local Government Board inquiry (held by Mr. R. H. Bignell), into an application by the Stockport Corporation for sanction to borrow £14,000 for the purposes of the gas undertaking, the Engineer (Mr. S. Meunier) explained that £2000 was for a sulphate of ammonia plant, and £12,000 for the general extension of the mains and services, the expenditure to be spread over three years at £4000 a year. With regard to the sulphate of ammonia plant, a contractor had previously taken the liquor, but had ceased to require it; and consequently the Committee had decided to erect the plant, which it was expected would be at work by the end of July. Some £1700 had already been paid for the work out of the current revenue; and in the event of the loan not being sanctioned, the work would have to be paid for out of the gas profits, otherwise used for the relief of rates. With regard to the mains, the Inspector asked what was the least possible sum that they could do with to meet urgent requirements. Mr. Meunier thought that if building operations were not carried on extensively during the year, they might do with half. The Inspector: Supposing you get £2000 to be going on with, you might then make application for a further sum when that is expended.

GAS COMPANIES IN THE STOCK EXCHANGE.

Business on the Stock Exchange last week was not quite on so light a scale as the week before, and the tone was fairly cheerful, especially just at the close, when the news of the Russians' success on the Dniester afforded one more example of their great recuperative powers. But markets in general at the present time do not exhibit much animation; and, while accepting favourable factors with subdued satisfaction, they keep a cautious eye fixed on the horizon of the future. Gilt-edged securities were pretty firm, and Americans were better, though the former were not unmindful of the competition of new issues and the anticipation of another War loan. Of new issues, the Grand Trunk was not a success, being under-subscribed. New South Wales is issuing 5 millions of 4½ per cent. 7-12 year bonds at 99½. But a good deal of money is going into Treasury Bills, which are in request. Improved figures of foreign trade for May were gratifying. The early closing question has been further adjourned by the bankers. By order of the Committee, the Stock Exchange now opens for business at 10.45 instead of 11, and the new practice was initiated last Thursday. *Per contra*, the House was closed on Saturday. Business in the Gas Market was more active than the previous week, and better spread through the list of undertakings—a greater number of Provincial issues changing hands. Prices in one or two lines were a little easier; but on the whole there was not much change.

Bargains done for cash during the week were as follows: On Monday, Bournemouth "B" 13$\frac{13}{16}$, 13$\frac{7}{8}$, Commercial 4 per cent. 93, 93½, Gas Light Ordinary 86$\frac{5}{8}$, 87, 87$\frac{1}{8}$, ditto debenture 67$\frac{1}{4}$, 67$\frac{3}{4}$, Imperial Continental 80, South Metropolitan 92, 94, 94$\frac{1}{4}$, Sheffield "A" 215. On Tuesday, Alliance and Dublin 66$\frac{7}{8}$, 67, Bombay 5$\frac{5}{8}$, Commercial 4 per cent. 93, 93½, Gas Light Ordinary 86, 87, ditto maximum 69½, 69$\frac{3}{4}$, 69$\frac{5}{8}$, ditto preference 87, ditto debenture 67$\frac{5}{8}$, 67$\frac{3}{4}$, Imperial Continental 79$\frac{7}{8}$, 80, ditto debenture 75, Primitiva 3$\frac{1}{4}$, ditto preference 4$\frac{7}{16}$, ditto debenture 92$\frac{7}{8}$, 93, 93$\frac{1}{8}$, South Suburban 100, 101. On Wednesday, European 14$\frac{5}{8}$, 14$\frac{3}{4}$, Gas Light ordinary 86, 86½, 87, Imperial Continental 79, Primitiva 3$\frac{5}{32}$, ditto preference 4$\frac{5}{16}$, ditto debenture 92$\frac{7}{8}$, 93, 93$\frac{1}{8}$, South Suburban 100, 101. On Thursday Bournemouth "A" 29$\frac{1}{4}$, 29$\frac{5}{8}$, Gas Light ordinary 85$\frac{1}{4}$, 86, 86$\frac{1}{4}$, ditto maximum 70$\frac{1}{4}$, 70$\frac{3}{4}$, ditto preference 87$\frac{1}{4}$, 88, ditto debenture 67$\frac{1}{4}$, 67$\frac{3}{8}$, 67$\frac{3}{4}$, Primitiva 3$\frac{1}{4}$, South Metropolitan debenture 67$\frac{3}{4}$, Tynemouth 106. On Friday, Gas Light ordinary 85, 85$\frac{3}{4}$, ditto debenture 66, 66$\frac{1}{4}$ *ex div.*, Liverpool 101$\frac{7}{8}$, 102, Primitiva 3$\frac{1}{32}$, ditto debenture 93, 93$\frac{1}{8}$, South Metropolitan 93, South Suburban debenture 109, 109$\frac{1}{4}$.

Bank rate (fixed Aug. 8), 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING JUNE 12.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59—64	3 18 2	66¼—67
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5¼—6⅜	5 17 8	5⅜
50,030	10	Feb. 26	16	Bournemouth Gas and Water { 10 p.c.	29—30	5 6 8	29½—29⅝
373,480	10	,,	7	B 7 p.c.	15—15¼	4 10 4	13$\frac{13}{16}$—18⅞
95,000	10	,,	6	Pref. 6 p.c.	13¾—14	4 5 9	..
—	—	—	—	Deb.	..	—	..
880,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	5 5 3	..
330,000	,,	,,	11	Do. New	204—209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	5 3 4	..
244,200	,,	,,	8	Do. A Ord. Stk.	154—159	5 0 8	..
530,000	20	Mar. 26	12½	British	44—45	5 11 1	..
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
945,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb	85—87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1⅛—2⅛	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	103—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	5 1 2	93—93½
560,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½—71½	4 3 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76—79	5 1 3	..
200 000	,,	,,	7	Do. 7 p.c. Pref.	115—118	5 18 8	..
—	—	—	—	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	Derby Con. Stk.	123—125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½—18	5 11 1	14⅝—14¾
16,362,910	Stk.	Feb. 12	4/17/4	Gas Light and Coke { 4 p.c. Ord.	98—102	4 15 6	85—87⅛
3,600,000	,,	,,	3½	3½ p.c. max.	76—79	4 8 7	69½—70⅝
4,062,235	,,	,,	4	4 p.c. Con. Pref.	96—99	4 0 10	87—88
4,674,850	,,	June 11	3	3 p.c. Con. Deb.	72½—74½	4 0 6	66—67¼†
130,000	,,	,,	10	10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	Hongkong & China, Ltd.	16¼—16¾	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7⅛†	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅛†	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150—160	5 12 6	79—80
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	75
300,342	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 6	..
561,000	Stk.	Feb. 26	10	Liverpool 5 p.c. Ord. { A	211—213	4 13 11	101⅞—102
718,100	,,	,,	7	{ B	146—14	4 14 7	
306,083	,,	June 26	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..
75,000	5	June 11	6	Malta & Mediterranean	4⅛—4⅜	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 28	4	Monte Video, Ltd.	11½—12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—15	5 2 8	..
300.000	Stk.	May 14	8	Oriental, Ltd.	117—122	6 11 2	..
60,000	5	Mar. 26	10	Ottoman, Ltd.	7½—7⅞	6 9 0	..
60,000	50	Feb. 26	13	Portsea, Island B	128—131	4 19 8	..
100,000	50	,,	19	Do. C	118—121	4 19 2	..
52,000	50	,,	10	Do. D	..	—	..
249,980	5	April 29	8	Primitiva Ord.	5⅛—6	6 18 4	3¼—3⅜
499,960	5	June 26	5	,, 5 p.c. Pref.	4½—5	5 0 0	4$\frac{5}{16}$—4$\frac{7}{16}$
521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	4 6 0	92⅝—93⅝
—	—	—	—	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	San Paulo { 6 p.c. Pref.	10¾—11	5 9 1	..
125,000	50	July 1	5	5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	213—224	4 9 8	215
209,984	,,	,,	10	Do. B	222—224	4 9 8	..
523,500	,,	,,	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	South African	10½—11⅛	7 16 6	..
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111—113	4 16 8	92—94½
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	67¾
309,320	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	5 3 2	109—101
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	4 9 3	..
—	—	—	—	Do. West Kent.	..	—	..
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	107—109½
629,740	Stk.	May 14	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7⅛†	Tottenham District { A 5 p.c.	135—138	5 8 8	..
742,275	,,	,,	6†	B 3½ p.c.	115—117	5 2 7	..
184,255	,,	June 26	4	4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	5 5 2	..
236,476	Stk.	Mar. 12	6	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	106
30,000	Stk.	Feb. 26	3⅜	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6⅞	,, B 3½ p.c.	129—134	5 9 7	110
108,075	,,	,,	5/17/6	,, C 3½ p.c.	110—115	5 9 0	..
352,000	,,	,,	6⅛	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅜	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

† The lower quotation was "ex div."

Stockport Gas Charges Advanced.—As a result of the decision of the Town Council to increase the price of gas within and outside the borough of Stockport, the price fixed is from 2s. 6d. to 3s. per 1000 cubic feet for ordinary consumers within the borough, and from 2s. 10d. to 3s. 4d. outside the borough—the latter price being subject to a discount of 2d. per 1000 feet for payment within the time prescribed. The rate of 3s. per 1000 cubic feet includes power supplies. In regard to prepayment meters, the present discount of 1½d. in the shilling is to be discontinued. The new charges operate from the current quarter's readings.

Eightpence Increase at Newton and Earlestown.—At a special meeting of the Newton-in-Makerfield Urban Council last week, the principal business was the reconsideration of a proposed increase in the gas charges; a previous recommendation of the Gas Committee that the price should be advanced 8d. per 1000 cubic feet having been referred back. The Clerk said that during the past year there had been a reduced income from almost all residual products, and an increased expenditure in various directions. Mr. Goslin said the matter had been thoroughly thrashed out by the Sub-Committee, and they had taken the only possible course in recommending an increase of 8d. The resolution to increase the price to this extent was confirmed.

Increased Prices at Stretford.—Owing to the increase in the price of coal and additional expenses due to the war, the Stretford Gas Company announce to their consumers that they are reluctantly compelled to raise the price of gas; but it is hoped that the increase in the charges, though now necessary, will be of only a temporary character. From and after the readings of the meters for the June quarter, consumers of under 25,000 cubic feet per quarter will be charged 2s. 7d. per 1000 cubic feet; over 25,000 and under 500,000 feet per quarter, 2s. 6d.; over 500,000 feet per quarter, 2s. 5d. After June 1 (from the date of alteration in the meter in each case) the price of gas supplied through prepayment meters in the whole area of supply is to be at the rate of 1d. for 27 cubic feet.

The Increased Price at Swansea.—A paragraph which appeared on p. 596 of last week's "JOURNAL" did not state quite correctly the increase that has had to be made in the price of gas at Swansea. The Company's intimation is that it will be necessary to increase the price of gas to ordinary consumers within the borough and one mile outside the existing borough to 3s. 2d. per 1000 cubic feet, and to all districts beyond the one mile radius from the existing borough boundary to 3s. 6d. To prepayment consumers there will be a reduction in the gas per penny from 24 to 22 cubic feet within the existing borough boundary and one mile therefrom, and beyond the one mile radius from the existing borough boundary from 22 to 20 cubic feet per penny, as from the day of recording meter-indices at the Midsummer quarter.

Gas Prices and the Rates at Knaresborough.—At a meeting of the Knaresborough Urban District Council, the Gas Committee recommended an increase in the price of gas of 3d. per 1000 cubic feet and that no allowance be made from last year's profits for the relief of the rates. It was eventually decided to increase the price of gas, but that the usual contribution of £250 be made to the rates.

Inspection of Meters at Southport.—A Sub-Committee of the Southport Gas and Electricity Committees appointed to consider whether some arrangement could not be made whereby the same inspectors should inspect the gas and electricity meters have reported: (*a*) That they had considered the arrangements necessary for having the gas and electricity meters read by the same inspector; (*b*) that they had dispensed with the services of two inspectors, and had instructed the Borough Treasurer and the Gas and Electricity Engineers to formulate and carry out the necessary arrangements as to the revision of the duties of inspectors; and (*c*) they recommended that a communication be sent to the Water Board suggesting the desirability of having the water-meters read by the same inspector as the gas and electrical meters. The report and recommendations were adopted by the Town Council at their meeting last Tuesday.

The Todmorden Town Council, at a special meeting last week, decided to advance the price of gas for lighting from 2s. 6d. to 3s. per 1000 cubic feet, and for power purposes from 2s. to 2s. 6d.

The Radcliffe and Pilkington Gas Company have, owing to the increased charges for coal and wages and lesser yields from residual products, decided to advance the price of gas 6d. per 1000 cubic feet, making it 3s. 4d.

APPLICATIONS FOR LETTERS PATENT.

8013.—CLARKE, A. G., "Gas-range." May 31.
8039.—CASBON, W., and BRENNAN, G. T., "Incandescent burners." May 31.
8183.—DUCKHAM, A. M'D., "Carbonizing fuels." June 2.
8219.—DAY, G. ST. J., "Globe support." June 3.
8255.—MATHEWS, C. L., "Gas-cooker." June 3.
8285.—ARNOLD, F., "Till for prepayment meters." June 3.
8317.—MACNAUGHTON-JONES, H. M., "Supporting shades, &c." June 4.
8331.—GRIFFITHS, H., "Gas-meters." June 4.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Wanted.

LADY DEMONSTRATOR AND LECTURER. No. 6049.
WATER-GAS MAKER. No. 6052.

Appointments, &c., Vacant.

GAS MANAGER. Ellesmere Port and Whitby Urban District Council. Applications by June 22.
GAS ENGINEER AND MANAGER. Droitwich Corporation. Applications by June 19.
GAS FITTERS AND PLUMBERS. Aldershot Gas, Water, and District Lighting Company.
SLOT-METER COLLECTOR. Aldershot Gas, Water, and District Lighting Company.
GASHOLDER ERECTOR (Tackle). No. 6050.
CLERK. No. 6051.
SHOW-ROOM SALESMAN. Box 268, care of Smith's Advertising Agency.

Plant, &c. (Second Hand), for Sale.

BOILER TANK. Bridgwater Gas Company.
LAMP STANDARDS. Glastonbury Gas-Works.
METER, &c. Emsworth Gas Company.
ROTARY WASHER, STEAM-ENGINE, &c. Blyth Gas Works.

"Journal" Volumes and Gas Books for Sale.

No. 6047.

Sales of Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. London Mart. June 29.
FELIXSTOWE AND WALTON WATER COMPANY. London Mart. June 29.

Meeting.

MALTA AND MEDITERRANEAN GAS COMPANY. £9 & 60, Gracechurch Street, E.C. June 29, 2.30 o'clock.

TENDERS FOR

Benzol.

DARWEN GAS DEPARTMENT Tenders by June 26.

Coal and Cannel.

ASHFORD GAS DEPARTMENT. Tenders by June 17.
BAKEWELL URBAN DISTRICT COUNCIL. Tenders by June 30.
BARNOLDSWICK GAS DEPARTMENT.
CANTERBURY GAS AND WATER DEPARTMENT. Tenders by June 26.
CALNE GAS COMPANY. Tenders by June 26.
COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL. Tenders by June 19.
CONNAH'S QUAY GAS AND WATER CAMPANY. Tenders by June 24.

Coal and Cannel (*continued*).

EAST RETFORD GAS DEPARTMENT. Tenders by July 2.
HAWORTH URBAN DISTRICT COUNCIL. Tenders by June 28.
HONLEY GAS DEPARTMENT. Tenders by June 21.
MARPLE GAS DEPARTMENT. Tenders by June 23.
SHANKLIN GAS COMPANY. Tenders by June 24.
STRATFORD-ON-AVON GAS DEPARTMENT. Tenders by June 19.

Condenser and Washer.

BIRKENHEAD GAS DEPARTMENT. Tenders by June 30.

General Stores (Fittings).

DARWEN GAS DEPARTMENT. Tenders by June 26.

Pipes, &c.

DARWEN GAS DEPARTMENT. Tenders by June 26.

Tar and Liquor.

DARWEN GAS DEPARTMENT. Tenders by June 26.
GAINSBOROUGH GAS DEPARTMENT. Tenders by June 19
HONLEY GAS DEPARTMENT. Tenders by June 23.

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